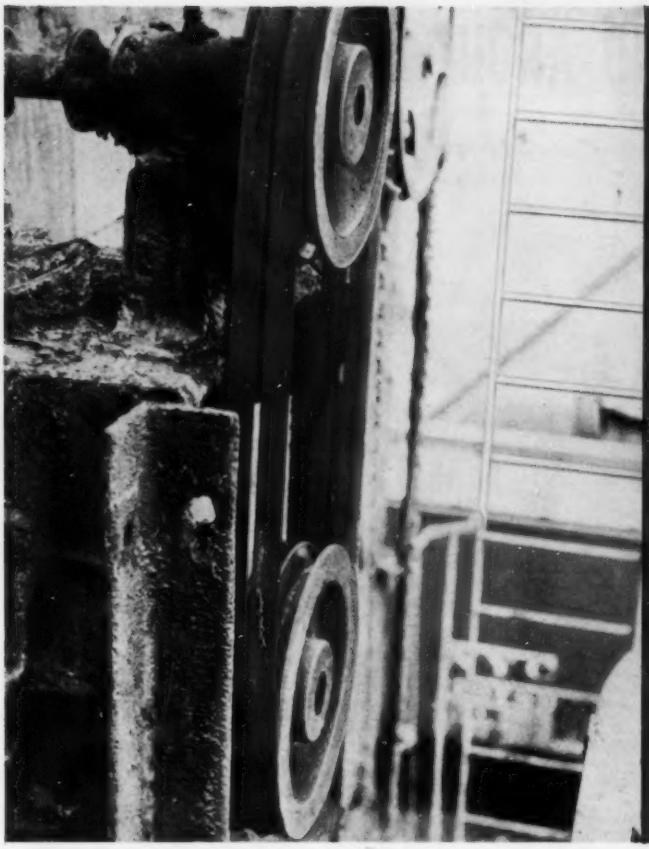
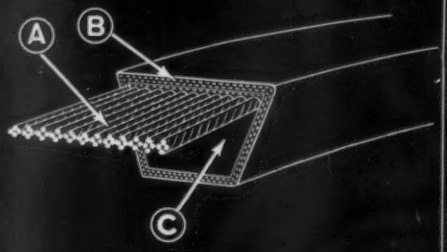


GOODYEAR INDUSTRIAL PRODUCTS

G.T.M.-Specified

HY-T V-BELTS

for heavy-duty, high shock load drives



A Single layer of chemically produced 3-T Cord in neutral plane carries the load, provides maximum strength and flexibility with minimum stretch.

B Super-tough fabric cover is bias-cut, long-wearing and oil-resistant.

C Cushion section of durable rubber.

G.T.M. solves eccentric problem—triples V-Belt Life

THIS eccentric drive—putting the shake in a paper mill's shakeout screen—soon shook the life out of belts previously used. Constant reversal of directions caused punishing shock loads. Dust, chemical attack and exposure to weather also took their toll. *Result: the longest belt life was a scant six months.*

Then the G.T.M.—Goodyear Technical Man—recommended a set of HY-T V-Belts (see blueprint). And at last report, these extra-rugged belts—muscled with Triple-Tempered (3-T) Cord—had been *going strong for 22 months and had plenty of life left.*

Want a moneysaving solution like this to *your* problem? Your Goodyear Distributor and/or the G.T.M. have the answer where V-belts or other industrial rubber products are concerned. Call them today—or write Goodyear, Industrial Products Division, Akron 16, Ohio.

HY-T V-BELTS by

GOODYEAR

THE GREATEST NAME IN RUBBER

Hy-T—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

For more facts circle 502 on Reply Card

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Plant Engineer To Conduct Equipment Maintenance Course

William M. Schieb, formerly plant engineer with the Continental Baking Co., has joined the faculty of the American Institute School of Baking as a maintenance instructor.

He went to work for Continental as a baker in 1934, after attending Gary (Indiana) College. He transferred to the maintenance department and after several promotions became plant engineer, the position he held at the time he left.

Mr. Schieb will be responsible for organizing and conducting the Institute's annual six-day course in Bakery Equipment Maintenance. He will teach the maintenance unit of instruction in the two 20-week courses in Baking Science and Technology, and in various short courses. While at Continental, he was responsilble for the training program for the plant's maintenance force.

Master Mechanic Promoted

Richard A. Vining, formerly holding the position of master mechanic at the Dodge Division of Chrysler Corp., was recently promoted to production engineering manager.

He is a graduate of Purdue University and the Chrysler Institute of Engineering and has served in a number of assignments in die and body engineering, tool development, pressed steel and automation work.

January 28-30—Dates of Plant Maintenance Conference

SMALLER MEETING groups to permit more intimate discussion of plant problems are planned for the eighth National Plant Maintenance and Engineering Conference to be held at the Public Auditorium, Cleveland, Ohio, from January 28 through the 30th.

As is customary, the conference will be held at the same time and places as the annual Plant Maintenance and Engineering Show. The conference will be held for three days while the show will run for four days, through the 31st.

The theme for the conference is "Good Maintenance or Bad—The Difference is Profit." Only one general session which all will attend will be held. Ten sessions, running simultaneously, will be devoted to maintenance problems of particular industries. These will include metal working, petroleum refineries; steel and textile mills; food processing plants; paper mills; rubber mills and others.

Maintenance welding has been added as a new topic this year. Other sessions will cover preventive maintenance, maintenance shops, maintaining electrical distribution equipment, lubrication, painting, yardsticks by which to measure the effectiveness of maintenance, and many others.

Advance registration cards and hotel information may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

Promotions at Carborundum

C. P. Clapp, formerly plant manager, has been promoted to the newly created position of manager of manufacturing

C. P. Clapp

J. S. Gaynor

at The Carborundum Co., Perth Amboy, N. J.

Following graduation from the Massachusetts Institute of Technology with a B.S. degree in Electrochemical Engineering in 1924, Mr. Clapp became associated with the Bonded Production Division at Niagara Falls, N. Y. Soon thereafter he transferred to the Perth Amboy plant where he served as maintenance engineer. In 1948, he was made industrial engineer in which capacity he functioned until January, 1952, when he became plant engineer followed by plant manager one year later.

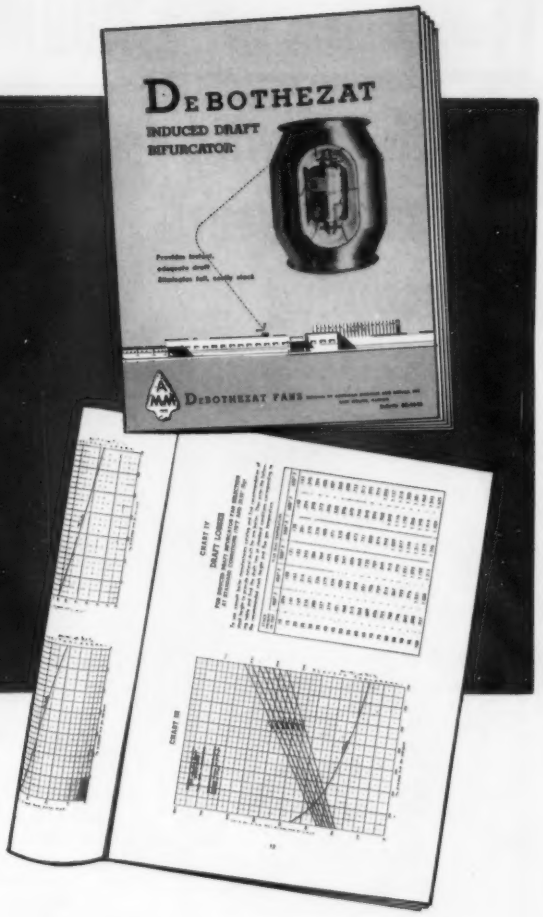
Jack S. Gaynor, formerly plant engineer, at Carborundum's Perth Amboy plant, was appointed to the new post of manager of manufacturing engineering.

Coming with Carborundum in 1948, he has served as project engineer, assistant plant engineer and plant engineer.

He graduated from Penn State in 1938 with a B.S. degree in Mechanical Engineering. Previously he was associated with the Harrisburg Machinery

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

NEW DEBOTHEZAT INDUCED DRAFT BIFURCATOR® CATALOG



all boiler code ratings expressed in BTU/HR

A valuable working tool for both the engineer and contractor. This new 20-page catalog gives all manufacturers' organizations boiler code ratings reduced to their common relationship of BTU/HR delivered to the steam.

Also included are useful tables and charts on volume of flue gas for oil, gas and coal. Facts are given on the selection, use and installation of Induced Draft Bifurcator Fans. Performance data and complete specifications on all DeBothezat Induced Draft Bifurcators are outlined in detail.

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A DIVISION OF
American Machine and Metals, Inc.
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Coupling problem?

THOMAS will help select your coupling

DOUBLE FLEXING

DBZ—for high speed, heavy duty drives

SINGLE FLEXING

SS—for engine-driven generator sets with outboard bearings

DOUBLE FLEXING

AMR—for engine and medium speed drives

FLOATING SHAFT

BMR—for heavy duty service with excessive misalignment

Your Thomas Sales Engineer, backed by 40 years of coupling experience, will help you select the correct type Flexible Coupling from the Thomas catalog. Or, he will engineer special variations for unusual cases. For all practical purposes, properly installed and operated within rated conditions, Thomas Flexible Couplings will last *forever*.

NO LUBRICATION • NO MAINTENANCE
THERE ARE NO WEARING PARTS

Under load and misalignment, only Thomas Flexible Couplings offer *all* these advantages:

1. Freedom from backlash—torsional rigidity
2. Free end float
3. Smooth, continuous drive with constant rotational velocity
4. Visual inspection while operating
5. Original balance for life

Write for Engineering Catalog 51A and the name of the Thomas Flexible Coupling engineer nearest you.

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA, U.S.A.

For more facts circle 504 on Reply Card

'ROUND ABOUT

Corp. as methods engineer and Mack Manufacturing Co. where he served as head of their production engineering department.

Machine Tool Electrical Standards

MACHINE TOOL users will be interested in the revised manual on Machine Tool Electrical Standards.

Providing a much clearer distinction between practices that are mandatory and those that are simply recommended, the new manual also treats at great length such subjects as motor and circuit protection, control circuits and circuit enclosures, and specifications for conductors. A section devoted to raceways and junction boxes contains a considerable amount of new material.

A three-page index and a four-page glossary of electrical terms are two new additions to the manual. Copies may be obtained upon request to the National Machine Tool Builders' Association, 2071 East 102nd St., Cleveland, Ohio.

Toxicology Lab for Industry

SAFEGUARDING the health of individuals coming in contact with new materials and chemicals will be the main objective of a new Industrial Toxicology laboratory, constructed recently in Northbrook, Illinois.

This laboratory will offer industry a practical solution to toxicity and related problems through the study of the toxicological and physiological properties of the new substances which research is creating every day.

The laboratory is equipped with modern and efficient facilities for the evaluation of the physiological and toxicological properties of chemicals on all forms of living organisms. In addition, there are laboratories for radioisotope studies and chemical research. A laboratory for inhalation studies and air pollution research and industrial bacteriology laboratories for work with bactericidal and fungistatic chemicals are included.

Facilities are also available to study the pharmacologic activity of drugs and cosmetics. A separate section is fitted with balanced aquaria to aid in the study of the effects of water pollution on fish and other marine life.

Readers interested in obtaining more information on how the facilities at the laboratory may help them with a particular problem should write to J. C. Calandra, M.D., Ph.D., President, Industrial Bio-Test Laboratories, Inc., 1810 Frontage Road, Northbrook, Ill.

Standards for Carbon Dioxide Extinguishing Systems

NEW STANDARDS for carbon dioxide extinguishing systems, have just been published by the National Fire Protection Association.

The new standards constitute a complete revision of previous material and present performance standards rather than detailed engineering standards. This 62-page standard covers all phases of the subject, including general information and requirements, total flooding systems, local applications systems, special systems for extended discharge, hand hose line systems, standpipe systems and mobile supply.

Copies of this pamphlet, NFPA No. 12, may be obtained at 75 cents per copy from the National Fire Protection Association, 60 Batterymarch St., Boston, Mass.

Editors Attend Chicago Editorial Conference of SBME

Editors talk shop at one of the round-table sessions which proved very popular at the recent Chicago Editorial Conference of the Society of Business Magazine Editors. Some readers may recognize our associate editor, Marjorie Weissman (left of center, background) and our editor, Tom Hanson, (right, background)

®Traveloader does a job here no other handling machine can do!

Traveloader easily picks up long, awkward loads from the side and carries them securely and speedily to near or distant points—without changing travel direction. This unusual feature enabled a large mid-western steel company to set up a highly efficient system for handling and yard-storing heavy curved corrugated steel plate sections.

Unit loads weighing up to 9,000 pounds are placed on the Traveloader by overhead crane at the fabricating department, transported to storage area and tiered along 12-foot aisles. As needed, sections are picked up by the Traveloader and delivered to the shipping platform. A special attachment permits handling of single sections or "split lifts."

As a direct result of this method the company uses yard space to much better advantage, fills orders faster and substantially reduces handling manpower.

The Traveloader also handles pipe, lumber, loads weighing over 4,000 pounds and any awkward loads. It does yard maintenance work, positions machinery and performs many other handling jobs not practical or possible with any other equipment.

★

Write for Bulletin 1360. It completely describes the remarkable TRAVELOADER that carries like a straddle truck, delivers like a road truck, and stacks like a fork truck.

Baker handling equipment

THE BAKER-RAULANG COMPANY

1251 WEST 80th STREET • CLEVELAND 2, OHIO

A subsidiary of Otis Elevator Company

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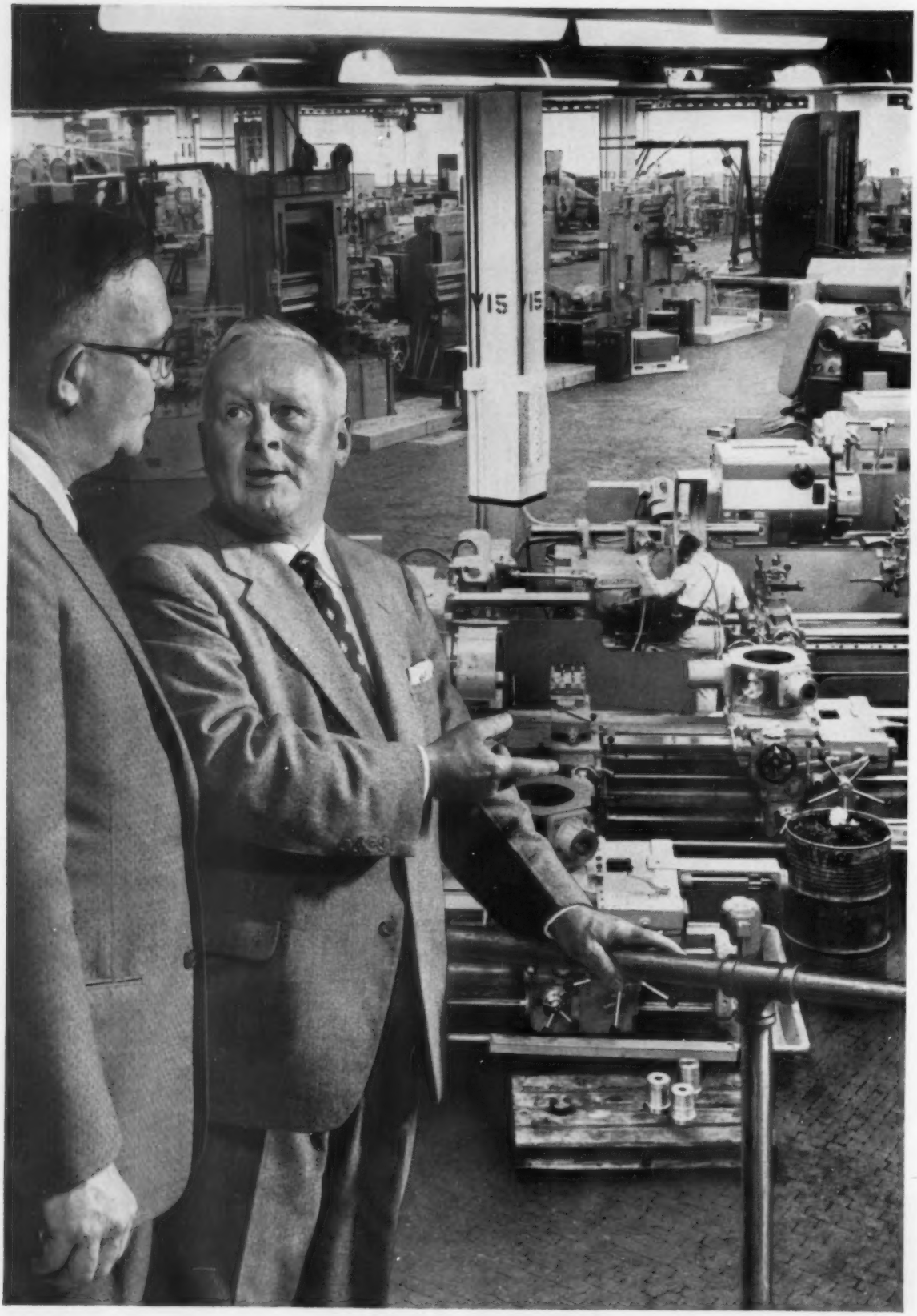

Y15 Y15

"My boss was stunned when I said . . .

'This plant looks modern... but electrically it's obsolete!' "

"About two years ago the plant manager and I were touring the shop areas. We were half way through when I turned and said, 'This plant looks modern . . . but electrically it's obsolete!'

"As plant electrical services engineer, I got his permission to make a study of our plant power distribution system.

"Even I got a big surprise. We found that the power supply wasn't as safe, dependable or flexible as we required . . . and maintenance costs were getting out of hand. A lot of our electric equipment was antiquated and took up valuable production space.

"We had spent so much time improving manufacturing processes and methods that we had neglected electrical needs. Electrically, we were obsolete . . . and not prepared for the big swing to automation.

"Our plant power distribution system has been modernized since then. We've installed more automatic equipment and work-handling devices, and we are ready to apply more advanced types of automation. Our new branch plant is being provided with electrical adequacy, too.

"You can probably do the same thing we did to get greater efficiency."

J-96101-1X

Is your plant suffering from electrical growing pains?

Surveys show that many of the nation's plants are inadequate electrically. A recent study of 42 plants in a given area revealed 88% had electrical problems that interfered with production.

These Problems Can't Wait

	Percent of Plants Inadequate — Electrically*
Inadequate transformer capacity and flexibility	42%
Questionable breaker interrupting capacity	63%
Lack of power centers	62%
Poor power factor	25%
No motor control centers	42%
No plug-in bus duct	32%
Low primary distribution voltage (below 4160 volts)	49%
Low secondary voltage (below 480 volts)	25%
Lack of network distribution systems	90%
Lack of automatic switching to maintain continuity	69%
Absence of 277-volt lighting	94%

*Based on report of survey in 156 top U.S. plants conducted by *Factory* magazine.

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

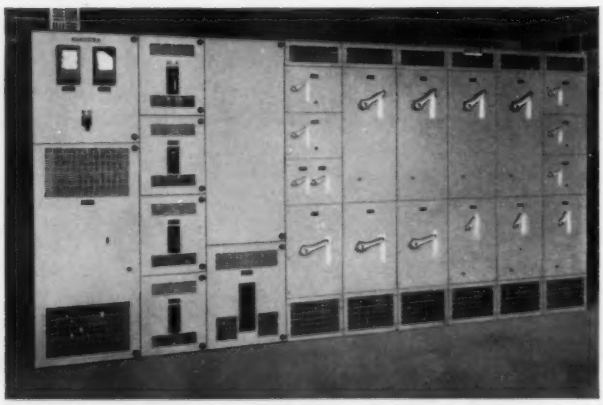
"I called in Westinghouse . . .

Electrical obsolescence disappeared"

Westinghouse switchgear is available in 10 basic units with a selection of standard instrument panels . . . future additions or replacements can be made easily and quickly any time.

"In the process of updating our plant power distribution system, we called upon Westinghouse for expert help. They worked with our staff and consulting engineers to give our plant electrical adequacy.

Westinghouse dry-type transformers save space, mount conveniently in out-of-the-way places. Well suited for wet, dirty or hot locations. Placement close to work load saves long, costly secondary runs.



Expansion with Westinghouse control centers frequently saves as much as 40% on installation costs over decentralized methods of mounting motor control. Inspection and service are simplified.

Switchgear gave us safer, more dependable operation

"We selected Westinghouse low-voltage, metal-enclosed switchgear which gave us high interrupting capacity, assuring safety and operating continuity. It reduced our maintenance, brought economic advantages and freedom to expand our facilities.

"In our new installation, unitized Westinghouse switchgear reduced our special design and engineering expense, and provided custom-built preciseness for our application requirements.

Capacitors paid for themselves in 18 months

"With Westinghouse guidance, we applied capacitors carefully at the substation bus, on secondary bus duct, and right at the motor loads. Savings on our power bill in the first year amounted to 75% of capacitor installed cost. Capacitors paid for themselves in 18 months, and the savings are still going on.

"The capacitors reduced the burden on our feeders and released electrical capacity for other needs. We got better voltage regulation at our motor and lighting loads.

Transformer provided convenient power . . . economically

"We wanted to get power close to the load . . . placing Westinghouse transformers strategically throughout our plant did the job conveniently, economically. For high-impulse levels we used oil- and askarel-filled units, while dry types were used when light weight and ease of installation were vital. I learned that a combination of Hipersil® cores and high-temperature insulation in Westinghouse transformers reduces size and weight one third.

Westinghouse capacitors are low in initial cost, require no maintenance, save additional investment in transformer capacity. Solder-sealed porcelain bushings protect against leaks or contamination of dielectric.

For more facts circle 506 on Reply Card

Packaged control simplified system design

"Westinghouse furnished control centers for our permanent machine arrangements. This gave us simplicity in planning and installation, a high degree of safety and flexibility, centralized operation and maintenance.

"Some of our machines were subject to frequent moving. Here we used Westinghouse plug-in bus duct with individual controls at each machine. In both cases, we found that Westinghouse packaged control equipment simplified system design, reduced some costs up to 40%.

"Why not call Westinghouse . . . like I did?"

"I'm sure you'll find Westinghouse a real lifesaver in helping out with your plant power distribution systems, too. Their engineering team will gladly work with your staff and your consulting engineers. I got our plant on the road to electrical adequacy by getting in touch with my local Westinghouse representative."

For more information, call your local Westinghouse sales office or send coupon. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-96101-2X

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

Westinghouse Electric Corporation
3 Gateway Center, P. O. Box 868
Pittsburgh 30, Pa.

☐ I would like a showing of the 20-minute film, *Selecting the Right Industrial Distribution System.*

I'm interested in more information about:

☐ Switchgear ☐ Capacitors

☐ Transformers ☐ Controls

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FIRM _____

ADDRESS _____

CITY _____ STATE _____

1. SIX HERMAN NELSON HEATING AND VENTILATING UNITS blanket the Chrysler Corporation's Transmission Plant shipping department doorways. Suspended from the ceiling, they hang out of the way . . . provide quiet operation. Available in heat capacities ranging to one million BTU's.

Architects and Engineers:
ALBERT KAHN ASSOCIATED ARCHITECTS & ENGINEERS, INC.
Detroit, Michigan

Mechanical Contractor:
FREYN BROS., INC.
Indianapolis, Indiana

HERMAN NELSON heating and ventilating equipment chosen for new Chrysler transmission plant

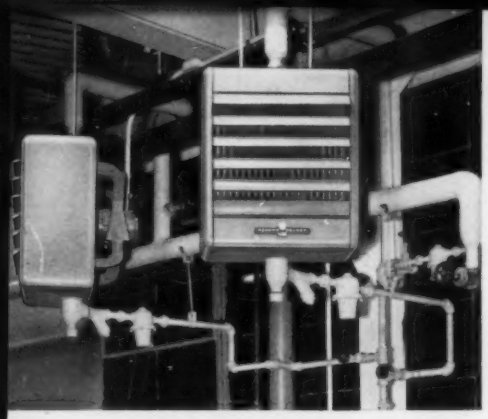
Complete Herman Nelson line . . . at work in Kokomo:

Heating and Ventilating Units
Unit Blowers
Vertical Unit Heaters
Horizontal Unit Heaters
Centrifugal Fans
Exhausters

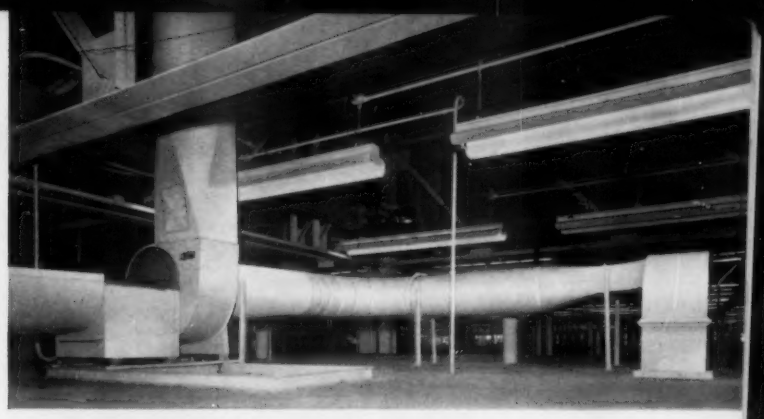
plus AAF Air Filters and Dust Collectors, and Illinois Engineering Steam Specialties

When Chrysler Corporation planned its huge new automatic transmission plant at Kokomo, Indiana, it made certain that all departments would be properly heated and ventilated—and in the most efficient way possible. Selection of Herman Nelson equipment on such a plant-wide scale demonstrated Chrysler's confidence in Herman Nelson.

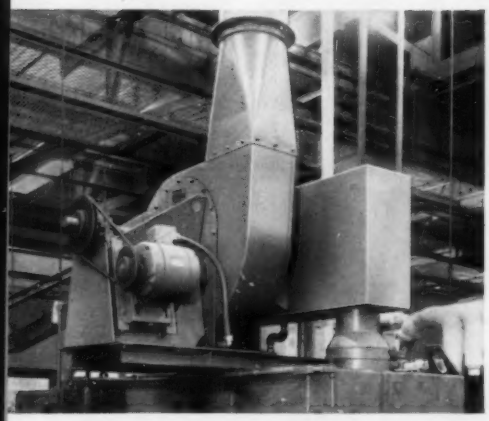
If yours is a problem requiring better air, remember . . . *better air is our business.* You can *depend upon* the quality, performance and efficiency of this *complete* line of air handling equipment. Call on our nation-wide sales and service organization for any help you need.



2. A PAIR OF HERMAN NELSON HORIZONTAL UNIT HEATERS blanket a window area in the penthouse storage area at the Kokomo, Indiana, plant. Using either steam or hot water, compact in design, these heaters are available in 18 sizes.



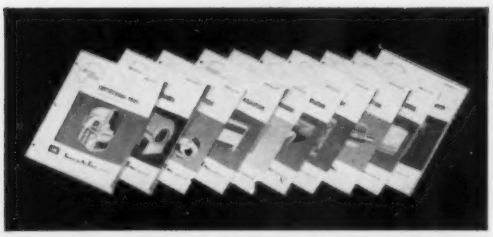
3. HERMAN NELSON UNIT BLOWER used for exhausting the manufacturing area. A completely "packaged" blower, easy to install, the unit features a hinged drive-side cover and outboard sheave that permits complete, easy-to-get-at servicing of belt and motor.



4. A NEW AAF TYPE K INDUSTRIAL EXHAUSTER provides high efficiency in various heat treating operations at the Kokomo plant. Exclusive Taper Lock Hub Assembly on this completely "packaged" unit allows fast, easy changeover on heavy-duty applications where periodic wheel replacement is anticipated. Eliminates the problem of impellers freezing to shafts.

5. HERMAN NELSON CENTRIFUGAL FAN supplying filtered and heated air to main factory area (hot blast system) at the Chrysler plant. AAF air filters and Illinois Engineering steam traps in system were included in this installation. The smaller unit in illustration is a Herman Nelson Unit Blower Size BBZK-1800, exhausting toilet space in penthouse.

6. A HERMAN NELSON VERTICAL UNIT HEATER with louver diffuser discharges air vertically downward or at angle in various directions. Located in the main factory area, it is high on the ceiling, out of the way, yet directing warm air, without drafts, wherever it is needed.



FREE . . . A wealth of useful data is available to you in these NEW, easy-to-read Herman Nelson catalogs. Request the ones you need on your business letterhead.

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228 Central Avenue • Louisville 8, Ky.

AAF
Herman Nelson

Better Air Is Our Business

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Gulf Sales Engineer T. F. Irving checks with Frank Buettner, heat treating foreman, on the results of hardness obtained in heat treating bolts at Lamson and Sessions' plant in Cleveland, Ohio.

Why one of the world's largest nut and bolt manufacturers

–Lamson and Sessions–

has been a long-time user of

Gulf Super·Quench

The metallurgists at Lamson and Sessions discovered that with Gulf Super-Quench they were able to achieve deeper, more uniform hardness without cracking or distortion and virtually eliminate rejections. Furthermore, it made possible the use of steels which previously could not be hardened to their specification.

Lamson and Sessions was also impressed with the ability of this outstanding quenching oil to retain its quenching power indefinitely with only normal make-up and that there was no need for additive replenishment.

Let a Gulf Sales Engineer help you discover profitable opportunities to use Gulf Super-Quench in your plant. Consult the yellow pages of the telephone directory for the number of your local Gulf office.

Clip and send the coupon for your copy of our informative brochure on this quality product.

GULF

Gulf Oil Corporation • Gulf Refining Company
1822 Gulf Building, Pittsburgh 30, Pa.

PE

Gentlemen:

Please send me, without obligation, a copy of your 24-page brochure dealing with the application and advantages of Gulf Super-Quench.

Name _____

Title _____

Company _____

Address _____

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BETTER ELEVATORING IS

No installation is too **large**

FREIGHT ELEVATORS for loads ranging from 40,000 pounds down to 2,500 pounds.
Booklet B-705 describes Otis Heavy Duty Freight Elevators.
Booklet A-414 describes Otis Plunger Electric Freight Elevators.
Booklet A-382 describes all Otis Vertical Transportation equipment and services.

FREIGHT ELEVATORS for loads ranging from 2,500 down to 1,500 pounds.
Booklet B-720 describes Otis Self-Supporting Light Duty Freight Elevators.

We'll be glad to send you any or all of the above booklets.

ELECTRIC • PLUNGER ELECTRIC
freight elevators
LIGHT, GENERAL, AND HEAVY DUTY
ELECTRIC DUMBWAITERS

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N. Y.

No
installation
is too
small

THE BUSINESS OF OTIS

OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

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ROCKWELL-BUILT

TWO NEW DELTA

ALL NEW DELTA 15"

World's most versatile drill press for all-around shop use—extra rugged for production work!

WORLD'S MOST COMPLETE LINE—Choose from the world's widest range of models for every production and shop need: floor, bench, multiple-spindle set-ups—production or standard table—plus a complete line of components for adapting to special-purpose operations.

AMAZING VERSATILITY—*Only* Delta gives you a selection of *six* spindle adaptors for dozens of operations. And they're mounted on a ground taper for *complete* accuracy, feature a threaded collar for *positive* locking.

EXCLUSIVE "UNIVERSAL" HAND FEED—*Only* Delta combines the best features of pilot wheel and single lever feeds with an exclusive universal hand feed. Gives you adjustable leverage—freedom from striking table or fixtures—almost infinite choice of feed lever positions.

BUILT FOR PRODUCTION WORK—Spindle has four over-sized, pre-loaded, lubricated-for-life ball bearings for *extra* ruggedness. Big 2" dia. quill and massive one-piece head casting provide greater rigidity. Multiple-spline "floating drive" minimizes vibration, assures smoother operation.

DELTA ROCKWELL another product by ROCKWELL

DRILL PRESSES!

GREAT NEW DELTA 20"

Designed for production tooling—
a big-capacity, heavy-duty drill press
that's built to last!

BIG CAPACITY—You get full 6" spindle travel with 5½' high column for additional spindle-to-table capacity. Choose from a complete line: floor, bench, multiple-spindle models—production or standard table—No. 2 or No. 3 Morse Taper Spindle.

RUGGED, ACCURATE—Double row, preloaded heavy-duty ball bearing close to the work load eliminates spindle play, assures years of lasting accuracy. Big 3¾" dia. centrifugally cast iron column with ½" thick wall is precision ground to size to give rigid backbone to machine, and extra weight for smooth, efficient operation.

SAFE, SIMPLE OPERATION—Molded, reinforced fibre glass belt guard completely encloses belt and pulleys, swings out of way for fast speed changing. Guard will not dent like steel, crack like iron, rattle like iron or steel. Quick-set depth gage with magnified scale is easy to see, easy to read.

See the great new Delta 15" and 20" Drill presses—compare with any others, *then make up your own mind! Your Delta Dealer is listed under "TOOLS" in the Yellow Pages of your phone book.*

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For more facts circle 510 on Reply Card

Cracker Jack Company replaces sash with Glass Blocks . . .

Saves annual maintenance costs of $150 per window opening

D. F. Vater, Cracker Jack's plant engineer, enjoys the benefits of heat-and-glare-reducing Suntrol Glass Blocks in his own office. The maintenance and repair of shading devices is another expense that the glass block panels have eliminated.

Modernization Pays Off

High maintenance costs for repairing windows *used to be* a problem at the Chicago plant of the Cracker Jack Company, famous confectionery producer. Two men worked almost full time greasing hinges, cleaning and replacing panes, welding, puttying, chipping, and painting sash. The annual bill for all this window maintenance came to about $150 per window opening.

This costly and recurring upkeep led to the investigation of glass block panels as a replacement for the old sash. The modernization program won company support, and glass block panels were installed a few years ago. Plant Engineer D. F. Vater, and his assistant, Mr. W. E. Gardner, report complete freedom from maintenance. Because the glass blocks are *mortared* into panels, there's nothing to rust, rot or paint. Hinge trouble is a headache of the past. There's no maintenance welding or puttying chores. Breakage is rare. And washing is an item that comes up only once or twice a year.

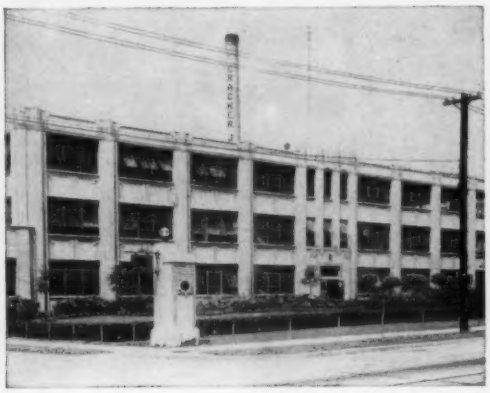
This modernization program paid off in more ways than maintenance control. These modern glass block panels solved a string of other plant problems, too. Excessive heat gain and chilly winter drafts are controlled. Glare and worker discomfort from direct sunlight is off the complaint list. Dirt and dust infiltration is no longer a housekeeping problem.

Temperature Control

One of the places where glass block

The stainless steel handrailing shown in the photo at the right provides a specific example of the temperature controlling advantages of Suntrol Glass Blocks. Sun, streaming through the old sash, heated the railing to such a degree that employees could not touch the metal. Now, with Suntrol, railings stay at room temperature.

Here's how Cracker Jack Company's plant looked before they modernized their window areas with PC Glass Blocks. The "after" photo shown at the left illustrates the architectural "face-lifting" glass blocks gave to this 30-year-old structure. The window modernization job was installed by the Expert Building Maintenance & Repair Co., Chicago.



panels went to work for effective temperature control was in second-floor offices and production areas along the front of the building, facing east. Here, morning and noon sun blazed through large window openings creating glare and increasing room temperature to an almost unbearable degree. Frequently, windows were opened on hot days and the air conditioning system in the plant office was upset. And in winter, chilly drafts off window surfaces caused numerous complaints from employees.

PC Suntrol Glass Blocks, installed in every window area in the front of the building, solved the problem. Each block incorporates a pale green diffusing screen that reduces heat and glare. Internal prisms scientifically direct or diffuse the daylight. Now, the offices and manufacturing areas are much cooler and the natural, controlled illumination is more effective. The high insulation factor of the panels, equal to an 8″ thick masonry wall, helps maintain balance in the air conditioning system, and keeps winter's cold on the outside.

Ban Dust and Dirt

Another advantage, so essential in food processing plants like Cracker Jack's, is the control of dust and dirt infiltration. Because each block is mortared solidly in the panel, and forms an air-tight seal with the wall, air-borne contaminants and dirt particles are kept out. Aside from food protection, the glass block panels play a big part in Cracker Jack's rigid housekeeping requirements.

Outdoor Advertising

Further dividends result from the favorable impressions the new exterior makes on the thousands of passing motorists who eye the Cracker Jack plant every day from busy Cicero Avenue. The crisp, clean looks of the glass block panels are a compelling advertisement for the sanitary manufacturing facilities inside.

For More Information

The PC Glass Block benefit story documented here at Cracker Jack Company has been repeated in installation after installation all across the country. If you are experiencing current window problems, or are planning a new building and want to avoid the headaches, you'll find it profitable to know more about PC Glass Blocks. See us in Sweet's, or write Pittsburgh Corning Corporation, Dept. PG-116, One Gateway Center, Pittsburgh 22, Pa. In Canada: 57 Bloor Street West, Toronto, Ont.

PC Glass Blocks

PITTSBURGH PC CORNING ®

Also manufacturers of FOAMGLAS® insulation

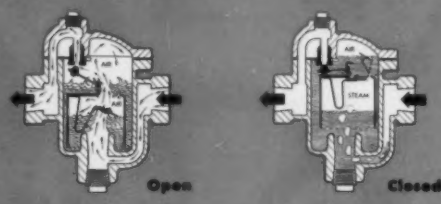
For more facts circle 511 on Reply Card

NO OTHER STEAM TRAP

gives you all these features for Low Pressure Heating Service!

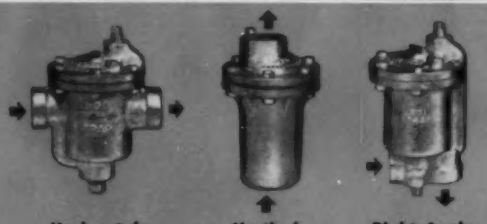
1. QUICK HEATING

Use of a "blast" bucket with auxiliary thermic vent gives maximum air-handling capacity. Air and water blow straight through until steam closes vent.



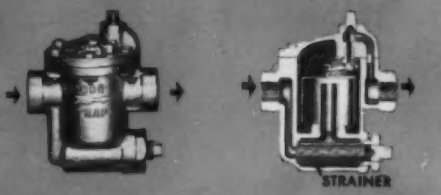
2. EASY INSTALLATION

Any pipe connection—horizontal, vertical or angle—available for the majority of installations to save time, labor and fittings.



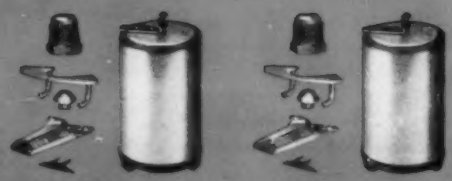
3. INTEGRAL STRAINER

The four most commonly used trap sizes are available with strainers built-in to the body to save time, labor and money through faster installation with fewer fittings.



4. STAINLESS MECHANISM

Valve and seat of hardened chrome steel, all other parts 18-8 stainless—*identical* to materials and workmanship used in traps for 900 lbs., 900°F.



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—the Armstrong Steam Trap Book gives complete data and prices, tells what size trap to use.

ARMSTRONG STEAM TRAPS

For more facts circle 512 on Reply Card

BULLETINS just released and of immediate plant interest

MATERIALS HANDLING

101 Conveyors and Accessories — Catalog 500, 48 pp, features company's Magnavator—an automatic elevator for handling small parts magnetically. It also describes the Tube-Veyor for bulk material handling, the Chip-A-Way piano hinge steel belt conveyor elevator, and other conveyor equipment. Typical applications are illustrated with diagrammatic drawings and advantages of design are pointed out. Prab Conveyors, Inc.

102 Overhead Dispatch System—Form F-192, 8 pp, describes an automatic overhead dispatch system designed to solve a variety of materials handling problems. Outstanding advantages are listed and typical installations are described and illustrated with detailed diagrams. Component equipment utilized in the system is individually illustrated and described. Richards-Wilcox Mfg. Co.

103 Wheel Conveyor—Six-pp Catalog LR-56 features descriptive detail on company's Live Rail wheel conveyor. Tells how it can be used to move, store or unload large and small packages, parts in process, palletized loads—almost any object with a smooth, flat bottom. Shows numerous illustrations of fixed and portable installations and tells about custom and pre-engineered conveyors. The Alvey-Ferguson Co.

104 Conveyor Pulleys — Twelve-pp Bulletin CP-80 covers company's complete line of conveyor pulleys, with detailed specifications and prices on those for original installation or replacement on package, production line, portable and general conveyor systems. Includes engineering drawings, illustrations and descriptive matter on all products. R. & J. Dick Co., Inc.

105 Industrial Trucks—This 132-pp catalog describes in detail company's many models of trucks available, indexed into five categories. Riding-type electric fork trucks and walkie electric fork trucks are covered in the first two sections, with operation photos, specifications and construction features included. Stackers and cranes are described in the next section. The final sections feature handlift trucks and floor trucks. Book is available to qualified plant engineers, please state your job title when requesting it. Lewis-Shepard Products Inc.

106 Lift Trucks—Latest trends in lift truck design are shown in 12-pp Form 1487, which is designed for quick reference of 20 industrial truck models ranging in capacity from 1000 to 30,000 lb. Various lift truck attachments are also described. Hyster Co.

107 Electronic Tractor — Bulletin 566 presents up-to-date information on the Guide-O-Matic, the electronic industrial tractor which requires no operator. A schematic warehouse operation route layout is included, along with installation data. Barrett-Cravens Co.

108 Crawler Tractor—A series of assembly and parts photos are used in 16-pp Catalog MS-1100 to illustrate the concise text on design, engineering and operating features of company's 75-hp HD-11 diesel powered crawler tractor. Also contains specifications and shows equipment matched to this tractor to increase its versatility and job performance capabilities. Construction Machinery Div., Allis-Chalmers Mfg. Co.

109 Bulk Materials Handling—Advantages of company's high-strength aluminum container for industries handling bulk materials, including granulars, powders, pastes and liquids are outlined in this 16-pp illustrated bulletin. Design features are fully described and specifications and dimensions are included, also a cost analysis sheet. Kaiser Nest-A-Bin Division.

CHAIN AND WIRE ROPE

111 High-Strength Chain—Bulletin DH-319 describes Accoloy X-Weld 125 chain, said to resist bending, breaking, and kinking. Lists such applications as sling chains, banding chains, load binders, towing chains and boomer chains. In addition to specifications, weights and dimensions, properties and applications of specially manufactured heat-resisting and acid-resisting chains are covered. American Chain Div., American Chain & Cable Co., Inc.

112 Wire Rope Assemblies—Catalog 5601, 24 pp, gives dimensions, drawings, capacities, and sizes for a line of wire rope assemblies, covering both terminals and wire rope. Applications are cited and descriptive detail is included on pin eye terminals, standard fork terminals, small ring eye terminal, large ring eye, oval eye, standard sleeve, threaded sleeve, standard hook, safety hook, swaged clevis and swaged eye terminals. Macwhyte Co.

STORAGE EQUIPMENT

113 Live Storage Racks — Bulletin RA-56 tells how custom and pre-engineered racks can store for short periods such items as short-lived inventory, parts in process, palletized loads, different-sized packages, component parts, others. Contains complete discussion of live storage principle, engineering details, components available, illustrations of typical installations. The Alvey-Ferguson Co.

114 Plan Filing Systems—Four methods of vertically filing plans, blue prints, maps etc., are shown in 8-pp Catalog 5. Included is company's standard Plan Hold which can be used in various "home-made" racks in place of sticks and slats. Plan Hold binders, made of lightweight aluminum, hold from 1 to 150 sheets. Also shown in catalog are a "carousel" filing arrangement, filing case units. Plan Hold.

115 File For Tracings—A new way to store tracings and blue-prints is illustrated and described in this informative booklet. Design features of the inter-lock file, which consists of units which dovetail together forming files into a solid unit, are detailed and advantages are pointed out. Eugene Dietzgen Co.

INSTRUMENTS, CONTROLS

116 Panel Control Systems—Fireye Series AC panel control systems for automatic oil, gas, and combination burners are described and pictured in 16-pp Bulletin CA-22. Contains full information on each packaged control system, and includes application, operation and component data, as well as dimensions. A concise selector guide is also presented. Individual components, standard with these systems, are described and identified, and optional equipment is listed and illustrated. Combustion Control Div., Electronics Corp. of America.

117 Radiation Pyrometers—Catalog C 93-1, 28 pp, discusses theory and principle of radiation pyrometry and describes company's Radiamatic pyrometer for temperature measurement. Included in this are the sapphire rod Radiamatic pyrometer, developed primarily for controlling temperature of molten germanium and silicon in seed crystal growing, and a high speed Radiamatic pyrometer. Construction features are detailed and general specifications for all models are given. Radiamatic accessories are also described, and typical applications covered. Industrial Div., Minneapolis-Honeywell Regulator Co.

118 Remote Reading Gages—Eight-pp Catalog 291, revised, shows new designs in remote reading liquid level gages, including the Red Flasher Truscale. This has a scale which flashes continuously in red for a positive warning when boiler water level gets too high or too low. Profusely illustrated with photos and engineering drawings, catalog covers gages in four pressure groups from under 900 to over 1500 psi. Jerguson Gage & Valve Co.

119 Time Controls—This 20-pp information booklet is designed as a complete reference to multi-purpose and industrial time controls. The booklet can be used as an up-to-the-minute check list of leading time switches and timers, and also provides answers for countless electrically operated automatic on-off operations. A fold-out reference chart defines each control, tells what it does, where it may be used and how to select it. Paragon Electric Co.

120 Thermostatic Controls — Eight-pp Catalog C-7, on thermostatic control valves, contains descriptive and engineering data on shower mixing valves, steam temperature regulators, water controllers, specialized control assemblies, tempering valves. Highlighted is a new concealed shower mixing valve. Lawler Automatic Controls, Inc.

121 Photoelectric Controls—Bulletin PA 561, 24 pp, tells how photoelectric controls provide simplicity in industrial automation and describes design, construction, installation and maintenance advantages. A large chart facilitates selection, listing applications, operating range, characteristics. Controls for various industrial purposes are covered, and specifications, dimensional diagrams and photos are included. Photoswitch Div., Electronics Corp. of America.

On pages 229-230 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

122 Control Devices—Bulletin GEA-6317 is a 12-pp publication describing application features of company's control devices built to meet JIC standards. Illustrated bulletin gives product data on the machine tool relay, oil-tight push button, solenoid, limit switch, magnetic starter, plugging switch, and pneumatic time-delay relay. General Electric Co.

123 Gaging Instruments — Twelve-pp Catalog IPC-6-56 discusses the principles of air-gaging with company's line of column instruments. Features basic tooling for inspecting internal and external dimensions and conditions, and types and sizes of adjustable airgage tooling. Many illustrations of single and multi-dimension gage use shown. The Sheffield Corp.

124 Recorder-Controller—A new approach to recording, indicating and controlling instruments required in industrial processing is described in Bulletin F-403. Instrument systems featuring four basic components that can be interchanged to perform a variety of functions, as well as minimize maintenance problems, are fully described, and photos, drawings and specifications included. Fielden Instrument Div., Robertshaw-Fulton Controls Co.

125 Temperature Controls—Catalog MC-135, 6 pp, describes company's temperature controls, with physical specifications, performance data, temperature ranges and other pertinent information on these precision thermostats. Also listed and described are modifications and special features, such as moisture-proof seals, armored cable, extended shell. Fenwal Inc.

126 Recording Controllers—Bulletin 979 describes two of company's pressure and temperature control products, a pneumatic recording controller and a recorder. Full technical specifications are included, as well as dimensional and other data. The A. W. Cash Co.

127 Instrumentation Bibliography—Bulletin G-2 is a 20-pp index of instrumentation literature offered by this company. It covers catalogs, bulletins, specification sheets, data sheets, illustrated lectures and articles from Instrumentation Magazine. Information on how to obtain this literature is given. Minneapolis-Honeywell Regulator Co.

PAINTS AND COATINGS

128 Protective Coatings — Synthetic rubber compounds for caulking, glazing and sealing and protective coatings for metal, masonry and wood are described in this 12-pp bulletin. Typical uses are listed and illustrated, and surface preparation and application detailed. Features are pointed out and a chemical resistance chart is included. David E. Long Corp.

BULLETINS

(Begins on page 21)

129 **For Red Lead Painting**—Technical Letter 11, 12 pp, covers recommended surface preparation of steel for red lead paints. In addition, it contains a handy reference table indicating recommended surface preparation methods for specific types of steel structures, red lead primers, exposure conditions and drying times. Lead Industries Association.

VALVES, PIPING, FITTINGS AND ACCESSORIES

131 **Diaphragm Valve**—Form 100, 12 pp, features descriptive and technical information on company's line of diaphragm valves. Describes valve design and valve material, basic methods of operation, applications, operational data and selection information. Tables of dimensions and dimensional diagrams are included. Hills-McCanna Co.

132 **Air Valves**—The design and application of air valves is treated in this 30-pp pocket-size booklet. Written in non-technical language, it begins with the principle of valving as used in water faucets, and continues through the evolution of simple straight-way and poppet types actuated by air. Parts, structure and action of more complicated valves are also covered. Mechanical Air Controls, Inc.

133 **Butterfly Valve Manual**—Forty-pp Catalog B-2 is designed to help engineers select valve types, understand their characteristics, and determine space requirements. It includes such useful data as: pressure drop and flow tables, conversion tables, theory and application, recommended materials, and describes rubber seat butterfly valves from 4 in. diam up, for handling liquids and gases. Photos, drawings and diagrams amplify the text. The Henry Pratt Co.

134 **Safety Device Tips**—These two publications include an 8-pp catalog and price list on company's safety devices for steam and hot water, and a 16-pp service guide, (Bulletin M-71). The former gives application suggestions and necessary ordering information on feeders and feeder cut-off combinations, low water cut-offs, pressure and temperature relief valves. The practical little service guide provides tips on piping hook-ups, testing, trouble shooting, and replacements. McDonnell & Miller, Inc.

135 **On Plastic Pipe**—Ace Supplex flexible polyethylene plastic pipe and fittings are described in 8-pp Bulletin CE-57. Gives applications for the pipe, sizes of standard pipe and fittings, installation instructions, properties, and estimated flow rates for water in various pipe sizes. A chart lists many common industrial liquids—acids, bases, organic chemicals, etc.—and tells which may be carried in this piping. American Hard Rubber Co.

136 **Plastic Pipe, Fittings**—Advantages, applications easy installation of company's polyethylene pipe and fittings are discussed in this 8-pp catalog section. Specifications and chemical resistance data are presented in tabular form. Flexible, semi-rigid and rigid types are covered, and fittings for each type are shown. Goodall Rubber Co.

137 **Lined Pipe, Fittings**—Fabrication techniques and technical information on applications of company's Lectro-Clad nickel-lined pipe and fittings are featured in this 8-pp manual. Photomicrographs illustrate pore-free and adherent characteristics of the nickel lining. A section, complete with engineering drawings, is devoted to welding procedures and general fabrication. Also given is technical information on use in paper and pulp industry, chemicals manufacturing, petrochemical industry, food industry, others. Bart Mfg. Corp.

138 **Welded Fittings**—Bulletin FB-502, 6 pp, describes briefly but completely company's line of carbon, alloy and stainless steel seamless welding fittings and forged steel flanges. Illustrated with photos, it shows various types and includes sizes. Tubular Products Div., The Babcock & Wilcox Co.

139 **Pipe Hangers**—Sixteen-pp Bulletin 156 gives complete specifications for company's Counterpoise pipe hangers, and provides engineering drawings of all models, weight-load selection tables, and erection and adjustment information. These hangers are designed to provide a constant load supporting capacity for piping systems subject to vertical movements caused by expansion and contraction of piping due to temperature changes. Levelglide hangers, which permit horizontal movement of piping, are shown. National Valve & Mfg. Co.

140 **Pipe Insulation Tape**—Techniques for protecting underground pipe from corrosion with "Scotchrap" brand pipe insulation tape is the subject of this 24-pp booklet, "Tape It Easy." It provides step-by-step photos and instructions for wrapping bends, elbows and short sections, patching pipe with tape, preparing joint surfaces for wrapping, wrapping welded joints and taping straight pipe sections as well as street "P" fixtures and other fittings. A summary of suggestions on pipe protection is included, as well as a coverage table listing recommended tape overlap, other data. Minnesota Mining and Mfg. Co.

AIR HANDLING

141 **Heavy Duty Fans**—Eight-pp Bulletin 4824 describes new Airfoil centrifugal fans for heavy duty industrial applications. Discusses performance features and construction details of the fans. Text is supplemented with photos and drawings of wheel, housing, bearing, shaft. Several possible volume control methods that can be used with these fans are described and evaluated. Brake horsepower curves for four volume control methods are included. American Blower Corp.

142 **Blower Selection**—Bulletin B-154A contains selection charts and other useful engineering information pertaining to Standardaire blowers, modern compressors adaptable to either pressure or vacuum service. Selection charts give blower model, brake horsepower and rpm needed to provide specified air-moving capacities in cfm at required pressures in psig or vacuums. Read Standard Corp.

143 **Improved Air Turning**—Catalog F 7912 describes the Uni-Flo Airturn, a ready-to-install air turning device designed for sweeping radius performance to the square duct corner. Includes pressure loss data which permits determination of true elbow losses throughout the air distribution system; also provides sizing and ordering information. Barber-Colman Co.

MECHANICAL POWER TRANSMISSION

144 **Hydraulic Fan Drives**—Bulletin 3009 describes company's hydraulic fan drive for air-cooled heat exchangers and cooling towers. Detailed information on the IMO motors and pumps and the worm gear reducers that make up the fan-drive unit are included, as well as performance curves useful for selecting the right unit for specific applications. De Laval Steam Turbine Co.

145 **Speed Reducers**—Booklet B-6727 is a 46-pp speed reducer engineering manual which presents complete application information such as hp ratings, torque capacity, overhung load values, dimensions, construction features, installation and maintenance for single, double and triple reduction. Engineering data is given in tabulated form, and dimensional diagrams, photos and cutaway views are included. Westinghouse Electric Corp.

146 **Industrial Friction Materials**—Bulletin FM-35-A, 16 pp, covers asbestos brake blocks, linings and clutch facings. A descriptive section covers moulded asbestos friction materials, woven materials and assembled sets for servicing popular industrial machines. Then there is a large section on design data, with most of the information arranged in chart form for easy reference. Johns-Manville.

Reader Service Cards for ordering bulletins are on pages 229-230. Be sure to include your name, job title, and company.

147 **Power Train**—Bulletin TV-100 is an 8-pp foldout booklet describing company's Transverter power train for fork lift trucks and other stop-and-go service. It emphasizes compact size, simple trouble-free components, easy installation and long service life. Three major components—torque converter, disconnect clutch and transmission—are illustrated, and a cutaway diagram is included, as well as specifications. Transmission Div., Clark Equipment Co.

148 **Mill Bearings**—Book 2665, 8 pp, describes company's line of mill bearings designed for heavy loads and severe impacts. Advantages of design and construction are detailed and applications in various industries pictured. Dimensional diagrams and tables of ratings are included. Link-Belt Co.

149 **V-Belt Fasteners**—Bulletin V-219 features V-belt fasteners for open-end v-belting, describing mechanics of the fasteners and detailing construction and design. Special tools for application are also described, and list prices are included. Flexible Steel Lacing Co.

New Publications on Good Plant Lighting

150 **Illumination Design Data**—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. A chapter on interior lighting design describes ways of calculating quantity of light for an area and covers such subjects as selection of lighting systems, maintenance factors, and location of luminaires. A series of tables minimize mathematical calculations necessary, and other tables provide information on ballasts and on fluorescent, incandescent and mercury lamps. Westinghouse Electric Corp.

151 **Lighting Reference Aid**—Descriptions, illustrations and lighting data on 394 industrial fluorescent lighting units manufactured by the company are featured in 36-pp Bulletin B. Among the units listed, are lighting systems for proper illumination of all types of plant work areas; from general lighting to critical seeing tasks, from damp, humid atmospheres to hazardous locations where explosive dust may be in the air. An easy-to-follow arrangement speeds up and simplifies reference according to reflector types, lamp types, accessories, construction and lighting data, and includes a tabulation of coefficients of utilization. Benjamin Electric Mfg. Co.

ELECTRICAL

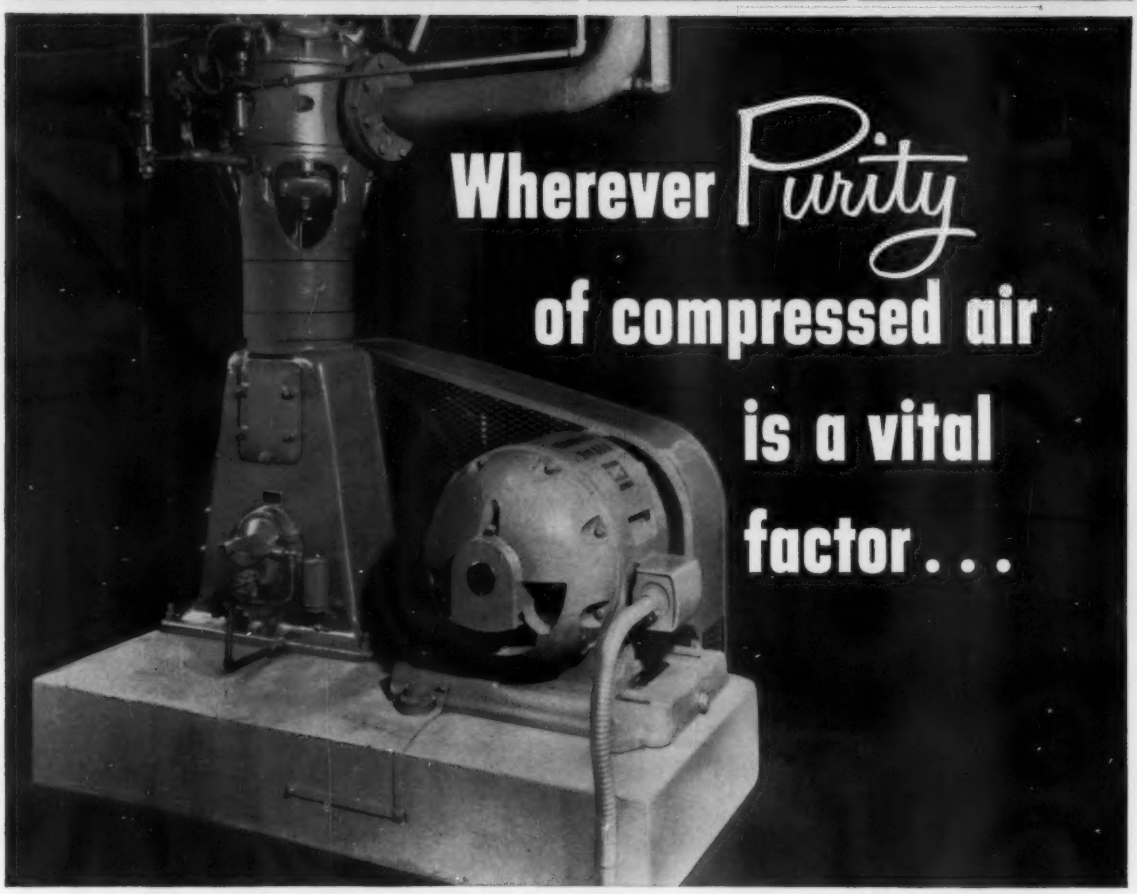
152 **Why D-C?** Improved control and other special advantages of direct current are detailed in illustrated 32-pp Publication GED-2868. Explains role of d-c drives in automation, availability of d-c power, and present day applications of d-c power. Some application areas for d-c drives are discussed, in particular their use in controlling or adjusting sheet tension. Also covered are use of d-c drives in controlling acceleration or deceleration and in applications involving frequent starting and stopping. General Electric Co.

153 **On D-C Motors**—Six-pp illustrated Bulletin 53B8424 describes direct-current motors, ½ through 200 hp, and motor-generator sets up through 200-kw output. Covers shunt and stabilized shunt wound, compound wound and series wound motors in eight enclosures, plus matching line of motor-generator sets for conversion of a-c to d-c. Bulletin provides cutaway view of a motor, showing design details, along with line drawings showing a variety of frame sizes. Allis-Chalmers Mfg. Co.

154 **Fan-Cooled Motor**—Latest design features of company's totally-enclosed, fan-cooled motors in NEMA rerated ratings of ½ to 30 hp (Type GZZ) and non-rerated ratings of ½ to 100 hp (Type APZ) are described in 6-pp Bulletin 51B7225D. In addition to cutaway views of motor, bulletin includes tables of ratings and dimensions as well as a horsepower frame chart. Allis-Chalmers Mfg. Co.

(More Bulletins on page 231)

ELECTRONICS | FOOD PROCESSING | ANTIBIOTICS | BREWING



JOY "WG-9" OIL-FREE COMPRESSOR

Joy WG-9 oil-free compressors are equipped with carbon graphite piston rings. These need no lubrication, and compensate automatically for wear. Special lightweight pistons; large, direct air passages; and liberal water-jacketing reduce heat and minimize ring wear.

Patented Dual Cushion valves are made of corrosion-resistant materials. All wearing areas except the rings, are either chrome-plated, surface-hardened, or made of stainless steel.

The Joy WG-9 is a double-acting, water-cooled compressor designed for *continuous* service. It is full force-feed lubricated and features replaceable-on-the-job cylinder and crosshead liners. Capacity is to 881 CFM, 125 psi. This unit is available also as a lubricated machine for standard air needs or for vacuum pump service.

Joy builds regular and oil-free compressors to meet any capacity and pressure requirement. For complete details, write to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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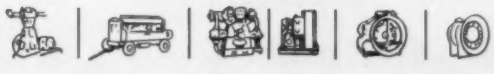


WBW 16160-104

JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

For more facts circle 513 on Reply Card

Your boiler is very likely big enough to take advantage of famous Ljungstrom efficiency. Even boilers as small as 25,000 pounds of steam per hour have grown up to a Ljungstrom. Completely shop-assembled, this new unit arrives in one package, ready for installation. And you can expect these immediate results:

FUEL SAVINGS: Generally, ten percent or more. This alone means write-off is possible in approximately three years.

INCREASED BOILER OUTPUT: Preheated air makes higher combustion temperatures, which means higher steam producing capacity.

LESS MAINTENANCE: Better combustion reduces slag, makes for longer periods between overhaul. Cleaner stack gases. Less smoke nuisance.

EFFICIENT USE OF EVEN LOWER GRADE FUELS: Higher furnace temperatures allow effective burning of low grades.

Find out how the efficient, low-cost Package Ljungstrom Air Preheater can be applied to your steam-generating units. Write today to the Air Preheater Corporation. Free brochure on request.

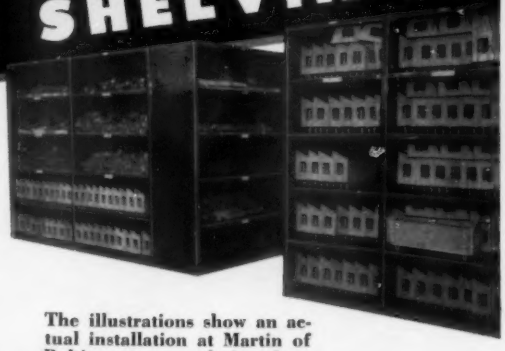
This "package preheater" is for boilers in the 25,000 to 200,000 pound per hour range

The Package Ljungstrom operates on the continuous regenerative counter-flow principle. The heat-transfer surfaces on the rotor act as heat accumulators. As the rotor revolves, the heat is transferred from the waste gases to the incoming air.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

For more facts circle 514 on Reply Card

BUYING STEEL SHELVING?



Why not buy Safety, Versatility Quality, and Lowest installed price rolled into one .. DELUXE!

The illustrations show an actual installation at Martin of Baltimore . . . designed to their specific needs.

MARTIN

ENGINEERED AND SERVICED BY YARRINGTON & JOHNS, INC., BALTIMORE.

For over 25 years DeLuxe has set the pace in individually-engineered shelving installations for industry. Creators of the *original* boltless shelving, DeLuxe builds every possible quality feature in each installation. It isn't like buying stock shelving when you specify DeLuxe. First of all, you buy shelving designed exactly to your specific needs. Next, you buy shelving that goes together as it should, hours or days ahead of ordinary shelving. Third, when your shelving is all set up you find it's a smooth, flush assembly - no rough edges - it's the *safest* shelving built!

Most important, too, is the DeLuxe design engineering service . . . without obligation, our factory organization will assist you to assemble the most economical, efficient setup for your particular application. To get a more complete knowledge of what DeLuxe has to offer, why not write for our new catalog #29-A, or contact your nearest DeLuxe dealer, listed in your Yellow Pages?

FREE: DELUXE 54-PAGE SPECIFICATION CATALOG #29-A. WRITE FOR IT!

A DIVISION OF THE ROYAL METAL MFG. CO.

DeLuxe

DELUXE METAL FURNITURE COMPANY

403 STRUTHERS STREET, WARREN, PENNSYLVANIA

For more facts circle 515 on Reply Card

MICRO precision switches

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN

here's the way to BOOST PLANT CAPACITY on a limited budget

In thousands of plants, all over the country, engineers and maintenance men are making their equipment more automatic and more productive by installing MICRO SWITCH precision switches. These switches are famous for their space-saving size, dependability, rugged housings and easy installation.

Plant production is increased at the very minimum of cost. As machines are made more automatic, operators do more and better work. Work is done more quickly under the safer conditions that protective switches provide. MICRO SWITCH interlocks save costly machines, dies and materials from damage.

This multiplication of plant work capacity through the use of MICRO SWITCH precision switches is easily done. Products of MICRO SWITCH, a division of Honeywell, are readily available. They are sold by authorized distributors in key cities everywhere.

Why not put new life into your present plant equipment? Look under "Switches, Electric" in the Yellow Pages for the name of the distributor near you. For technical assistance on switch problems, call MICRO SWITCH Engineering Service at the nearest branch office.

Any of these catalogs will be sent on request

62 "Basic Switches" • 65 "Micro Switch Trip Control"
73 "Toggle Switches" • 74 "V3 Switches"
75 "Subminiature Switches" • 83 "Industrial Enclosed Switches"
90 "Mercury Switches" • 101 "Switches for Industry"

HOW MUCH IS A NEW PRODUCTION IDEA WORTH? MICRO TIPS DIGEST IS FULL OF THEM—WRITE TODAY

Problem—*To shut off motor when oil supply is low.*

Solution—Two HONEYWELL Mercury switches were attached to float in oil reservoir. When re-filling is needed first switch lights a warning light. If level becomes dangerously low, second switch shuts off motor.

Problem—*to stop needle breakage in knitting machine.*

Solution—Two metal-enclosed MICRO SWITCH precision switches were installed at upper and lower limits of knitting machine. They shut off current if thread breaks either above or below the cone.

Problem—*to avoid broken band saw blades because of improper tension.*

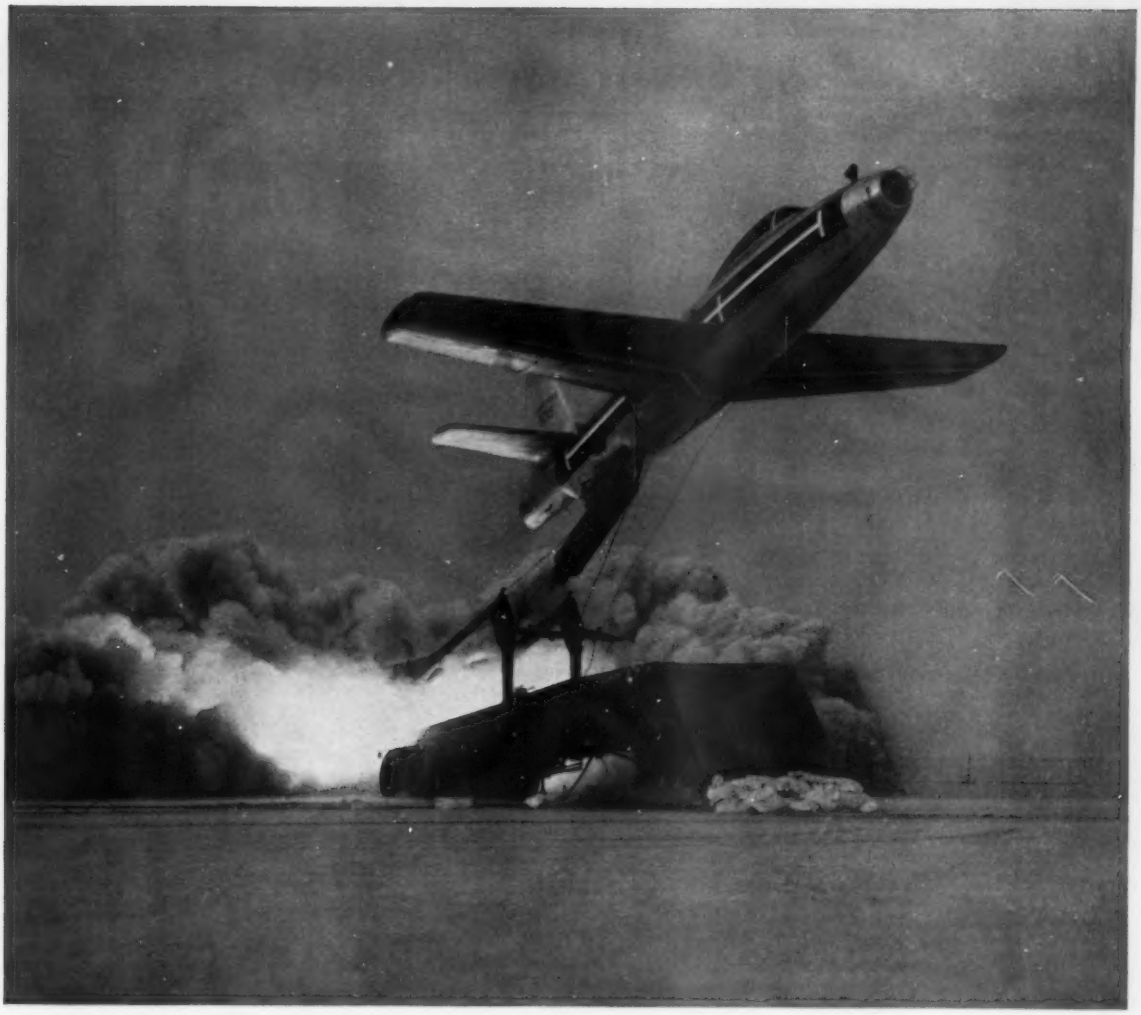
Solution—A MICRO SWITCH metal-enclosed switch is located on sliding sleeve at upper band saw wheel. When sleeve, which indicates tension, travels beyond danger point, switch turns on warning light.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

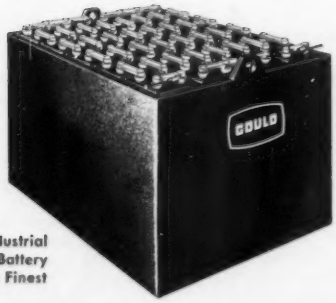
In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

For more facts circle 516 on Reply Card



Get off to a good start...

specify **gould** **BATTERIES**



Gould Industrial
Truck Battery
—America's Finest

YOU GET MORE THAN A BATTERY WHEN YOU SPECIFY GOULD:

More aggressive research program.
More application engineering help.
More and better battery performance.

Try us and see.
Gould-National Batteries, Inc., Trenton 7, N. J.

©1956 Gould-National Batteries, Inc.

Always Use Gould-National Automobile and Truck Batteries

More Power to you from Gould

For more facts circle 517 on Reply Card

If you are pumping or processing highly corrosive liquids and slurries, the Chempro Teflon† Packing-Seal Cage combination can drastically cut packing and shaft replacement, and keep your "down time" to a minimum. Pumping operations that formerly required daily repacking now operate continuously for months without repacking.

CHEMPRO TEFLON RING PACKING provides a frictionless, positive seal impervious to chemical attack. Chempro Styles 101 and 201 packing are available in ring sets, solid or split, to fit any pump or process equipment stuffing box.

CHEMPRO TEFLON SEAL CAGES for lubricating or cooling stuffing box packing are machined in a single flexible piece that snaps over the shaft, fitting snugly without vibration. They are non-scoring and corrosion-resistant, and last many times longer than metal lantern rings.

Ordering Information

1. Specify equipment make, model and size
2. Diameter of shaft
3. Bore and depth of stuffing box
4. Number of rings, solid or split
5. Material to be handled

THE ORIGINAL FABRICATORS OF TEFLON PACKINGS AND GASKETS

† duPont Trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

For more facts circle 518 on Reply Card

BACKTALK about our past issues

Edited by Marjorie E. Weissman

Disposal of Radioactive Waste

PLANT ENGINEERING:

"We are presently preparing a file of references regarding the establishment of a laboratory for the study of radioactivity.

"We note in the November 1955 issue of PLANT ENGINEERING, an announcement of the availability of a four page bibliography on sources for basic material on radioactive waste disposal methods and equipment.

"We would appreciate receiving a copy of this bibliography, if it is still available, to be sent to the attention of the library." *C. S. Iden, Librarian, International Harvester Co., Chicago, Ill.*

► Copies of the bibliography listing 50 publications on control of radioactive wastes are still available.—*Editors.*

No Product Endorsement By Us

PLANT ENGINEERING:

"In the item headed 'Errata' on page 24 of the September, 1956 issue of Industrial Improvement, you will note that we have stated that the concluding paragraph [in which endorsement was given to products mentioned in the article] of the article we reprinted, 'Conveyor Tows at Two Levels,' did not appear in PLANT ENGINEERING, in which the article was originally published.

"It is our policy and practice to conclude the articles of our members with a paragraph giving the name and address of the member, so that interested readers can write directly to the manufacturer for information. Incidentally, this also helps the editor who is his own typist.

"I realize that this is not the policy of PLANT ENGINEERING and regret that at the time I did not think of having the offending paragraph set in italics and separated from the PLANT ENGINEERING text by a dividing rule." *S. J. Borchers, Editor, Industrial Improvement, published by Industrial Improvement Association, Northbrook, Ill.*

► We would like to point out once more that PLANT ENGINEERING makes no editorial endorsement of any manufacturer's product, no matter how good that product may be.—*Editors.*

MAPI Accounting Method

PLANT ENGINEERING:

"An article in your June, 1956 issue, page 130, is entitled 'Let's Take a Look at Ourselves' by Maurice D. O'Hern.

"In this article, mention is made of the Machinery and Allied Products (MAPI) accounting method. We would be very interested in obtaining more details about this method and we should appreciate it if you could let us know who would be able to give us this information." *J. Celler, for Factory Manager, African Explosives and Chemical Industries, Ltd., Modderfontein Dynamite Factory P. O. Northrand, Transvaal, Africa.*

► Requests for information on the MAPI accounting method have been forwarded to Institute Secretary, Charles I. Derr, at 1200 Eighteenth St., N.W., Washington 6, D. C.—*Editors.*

Missing Pages

PLANT ENGINEERING:

"In going through an old issue of PLANT ENGINEERING magazine from which some sheets had been torn out, I find that an article I would like very much to have is incomplete in this particular copy. This article is entitled 'Fire Pumps' and was written by W. J. Blair of the Peerless Pump Div., Food Machinery and Chemical Corp.

"I will appreciate it if you can send me a copy of this article as we are contemplating adding jockey pumps to our fire protection system here at Maytag." *Burt Livingston, Chief Construction Engineer, The Maytag Co., Newton, Iowa.*

► Should any of our readers come across an article torn out of their copy of our magazine, we hope they will feel free to check with us to see if we have copies available.—*Editors.*

Maintenance Programs

PLANT ENGINEERING:

"Please send me a copy of 'Maintenance Control—By the Clock' which appeared in the March, 1956 issue and a copy of 'Maintenance—According to Schedule' which appeared in the May, 1956 issue." *H. T. Fowler, Comptroller, Lewis-Shepard, Watertown, Mass.*

Construction Briefs Booklets

PLANT ENGINEERING:

"We have received PLANT ENGINEERING at Brown Company and find it to be of great interest. We are especially interested in your Construction Briefs section, as this type of material is desirable in setting up a system of review instruction for our 12 plant maintenance engineers.

"Please advise which of these fundamental reviews you have had and those of which you may have copies available, also the price of 20 copies of each article." *Harold J. Blakney, Maintenance Engineer, Brown Co., Berlin, N. H.*

PLANT ENGINEERING:

"It would be appreciated if a set of the complete Construction Briefs series would

In a water conditioning service... results make the difference!

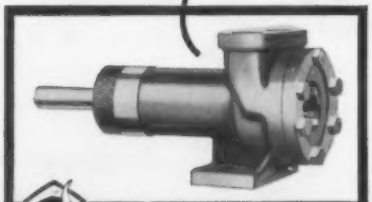
W. H. & L. D. BETZ, Philadelphia, Pa.

VIKING supplies the Oomph

One little Viking Pump supplies the hydraulic power to raise this lift up to 38 feet. The stand can be raised, lowered or stopped at any level from the ground or stand, simply by starting or stopping the electric motor-driven pump.

Used in motion picture studios for lighting equipment and camera work, this lift is manufactured by Hamlin Hydraulic Lifts, Monrovia Machine Works, San Gabriel, California. They also make portable hydraulic lifts for factory maintenance crews, storage room stackers, scaffolding stands, light bulb changers, orchard sprayers, casket lifts, and many others. Hamlin has built these lifts for more than 20 years, and has included Viking Pumps as an integral part of each unit.

If you're looking for positive, dependable pumping, learn more about Vikings. Write for Bulletin 56Sz.



VIKING PUMP CO.

Cedar Falls, Iowa U.S.A.

In Canada it's "ROTO-KING" Pumps

See our catalog in Sweets

For more facts circle 520 on Reply Card

BACKTALK

be furnished for use in the Public Works Department." *I. J. Waxman Chief Engineer, Public Works Officer, Marine Corps Air Station, Miami, Fla.*

▶ Since this series was started three years ago all the articles have been reprinted in three booklets. Each booklet covers one of three periods: July 1953 to May 1954; July 1954 to May 1955; and August 1955 to August 1956. All three are now available at 50 cents each.—*Editors.*

Scheduled Maintenance

PLANT ENGINEERING:

"I have just completed reading the article entitled 'Maintenance—According to Schedule' in the May, 1956 issue of your publication.

"As we are presently setting up a similar program in our plant, I was very much interested in the article.

"Would you kindly forward a reprint of the article, a mimeographed copy of the Maintenance instructions described, samples of as many as possible of the various forms used and whatever other information is available." *D. B. Barry, Plant Planning Engineer, Dominion Engineering Works, Ltd., Montreal, Que., Canada.*

Requirements for PE

PLANT ENGINEERING:

"In the June, 1956 issue of Plant Engineering magazine, Backtalk section, I note that reprints are, or may be available of 'The Plant Engineer,' from Simon and Schuster's 'Guide to Earning a Living.'

"I would certainly appreciate receiving a copy or two of this article on the duties of and requirements for a plant engineer." *Stanley F. Lindman, Plant Engineer, ElectroData Corp., Pasadena, Calif.*

▶ Copies of this article which gives the basic requirements for a career as a plant engineer are still available.—*Editors.*

Inquiries About Floodlight

PLANT ENGINEERING:

"Please have additional information forwarded to us on 'Wide-Lite,' described on page 134 of the September, 1956 issue of PLANT ENGINEERING." *W. A. Klein, Plant Engineer, Firestone Industrial Products Div. of Firestone Tire & Rubber Co., Noblesville, Indiana.*

PLANT ENGINEERING:

"I have just finished reading the article 'No Hot Spots or Shadows with Wide-Lite' in your September, 1956 issue and would like to have more information on the subject." *C. H. Stross, Asst. Plant Engineer, Republic Steel Corporation, Steel and Tubes Div., Cleveland, Ohio.*

PLANT ENGINEERING:

"Your article on 'Wide-Lite' lighting in the September, 1956 issue of your magazine has given us some ideas about its possible use at our plant.

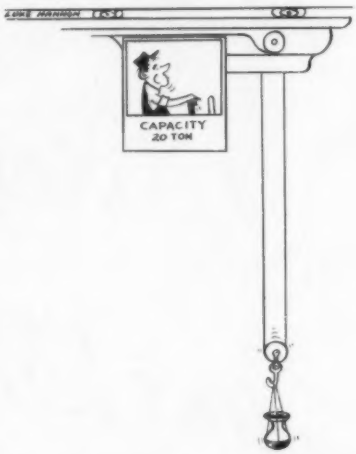
"Please send us additional information on 'Wide-Lite.' We are eager to know of the success others have had with such an installation." *Harold Sherman, Personnel Supervisor, Omaha Production Div. of Vickers, Inc., Omaha, Neb.*

▶ Inquiries on "Wide-Lite" have been forwarded to the manufacturer, the Wilson Electrical Equipment Co., Houston, Tex., who will forward additional information to our readers.—*Editors.*

Arc Welding Safety

PLANT ENGINEERING:

"We would appreciate receiving three tear sheets of 'Safety Practices in Arc Welding' from the August, 1956 issue of PLANT ENGINEERING." *M. E. McLean, Safety Engineer, Fels & Co., Philadelphia, Pa.*



PLANT ENGINEERING:

"Will you please send us reprints of your article 'Safety Practices in Arc Welding.' If there is a charge please let us know.' *Henry Wider, Personnel Manager, The Patterson Kelley Co., Inc., East Stroudsburg, Pa.*

▶ Tear sheets of this article are available sent with the compliments of the editorial department.—*Editors.*

Tear Sheets and Reprints

PLANT ENGINEERING:

"If reprints of the article in your June, 1956 issue entitled 'The Plant Engineer's Role in Industry' are still available, I would appreciate receiving a copy.

"Also kindly forward tear sheets from your September issue on the article 'Supplementary Lighting—Its Problems, Applications and possibilities.'" *I. H. Weaver, Division Engineer, Raybestos-Manhattan, Inc., United States Asbestos Div., Manheim, Pa.*

▶ Sets of tear sheets of both these articles have been sent to Mr. Weaver with our compliments.—*Editors.*

Here's how a leading

air line eliminates tie-up

of money and storage space

in aluminum for

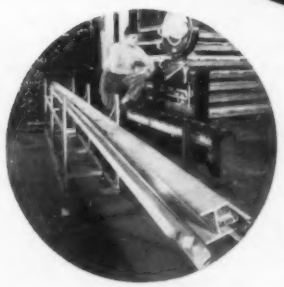
maintenance

work. They simply call the nearby

Alcoa Distributor and get*

immediate delivery of

standard items



from complete warehouse stocks.

*Your Alcoa® Aluminum Distributor can do as much for you. Look him up in the Yellow Pages. Aluminum Company of America, 953-L Alcoa Building, Pittsburgh 19, Pennsylvania.

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

WE CHOSE
ALCOA ALUMINUM
MILL PRODUCTS
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

FASTEN ALUMINUM WITH ALCOA ALUMINUM FASTENERS

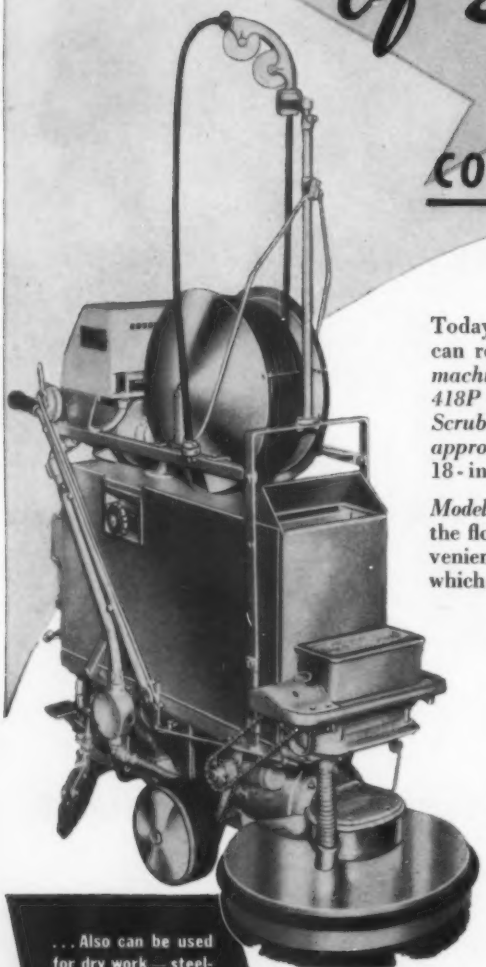
For more facts circle 521 on Reply Card

SMALL-AREA BUILDINGS...

Save 2/3 of Every Hour of Scrubbing Time

WITH A

COMBINATION SCRUBBER-VAC!



...Also can be used for dry work — steel-wooling, et cetera

(Powder Dispenser is an accessory)

Today, even buildings with but 2,000 to 15,000 sq. ft. of floor space can reap the labor-saving, cost-reducing benefits of *combination-machine-scrubbing.* Here's a *Combination Scrubber-Vac, Model 418P* at left, that's specially designed for such buildings. This *Scrubber-Vac,* which has an 18-inch brush ring, cleans floors in *approximately one-third the time* required with a conventional 18-inch machine and separate vac unit.

Model 418P applies the cleanser, scrubs, and picks up (damp-dries the floor) — *all in one operation!* Maintenance men like the convenience of working with this single unit . . . the thoroughness with which it cleans . . . and the features that make the machine simple to operate. It's *self-propelled,* and has a *positive* clutch. There are no switches to set for *fast* or *slow*—slight pressure of the hand on clutch lever adjusts speed to desired rate. The powerful vac performs efficiently and quietly. Compactly built, the *418P* also serves advantageously in larger buildings for the care of floors in narrow aisles and congested areas.

Finnell makes *Scrubber-Vac Machines* for small, vast, and intermediate operations, and in *self-powered* as well as *electric* models. From this complete line, you can choose the size and model that's exactly right for *your* job (no need to *over-buy* or *under-buy*). It's also good to know that you can lease or purchase a *Scrubber-Vac,* and that *there's a Finnell man nearby* to help train your maintenance operators in the proper use of the machine and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 5311 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

For more facts circle 522 on Reply Card

For more facts circle 523 on Reply Card →

Research

...helped make a good P&H Overhead Crane better

Ever since P&H built its first overhead crane back in the latter-day 1800's, its team of engineers has been working steadily to improve each successive model.

Improvements come about through research—painstaking, careful design—hours of testing and discarding and testing again. It's the same kind of research that contributed to the first major improvement in overhead crane design — the original P&H three-motor crane.

This research continues at P&H every day of the year. It's your guarantee that the P&H Overhead Crane you buy is the finest made.

Make sure you get the benefits of P&H research in your next overhead crane installation. Our engineers will be glad to work with you on your building plans — to show you how you can get the most out of your P&H Crane. A note on your letterhead will start him thinking for you immediately.

HARNISCHFEGER

MILWAUKEE 46, WISCONSIN

Research

. . . a P&H Hoist doesn't get that good by accident

Research, in the hoist business, doesn't mean a lot of men sitting at tables peering into microscopes. It does mean a lot of men out in the field, talking to customers, learning their problems, learning what the customer would most like to have in the next P&H Hoist he purchases.

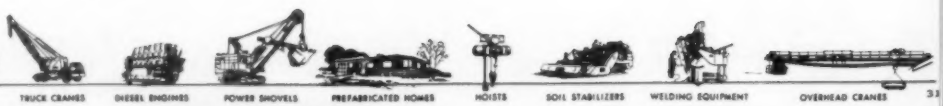
Yes, our basic research is done among our customers. The next step is to build a hoist embodying their suggestions—and to test it. After the new hoist has been proved in operation—and only after it has been proved—it goes on the market for your use. Because of this basic research, P&H is the most copied hoist on the market.

You can't buy P&H perfection in any other brand. Make sure your next hoist purchase is a P&H. See your nearest distributor or drop us a note for the free literature available on request.

HARNISCHFEGER

MILWAUKEE 46, WISCONSIN

the P&H Line



TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PREFABRICATED HOMES · HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES

For faster flow and freedom from plugging

filter fluids with American Felt!

The very construction and character of wool felt make it a natural for filtering liquids. The unique, fibrous structure of wool felt has these outstanding advantages: 1—Efficient particle retention. 2—Minimum pressure drop with corresponding high permeability. 3—Maximum solids capacity resulting in greater liquid throughput. 4—High porosity value responsible for low plugging rate and ease in cleaning. 5—Chemical and thermal stability. 6—Felt's thickness permits free use of third dimension in design and in true edgewise flow.

American's Wool Felts for liquid filtration provide efficient and economical filter media for cellulose nitrate, solvents, hot lubricating oil, paint, lacquer, latex, water, food syrups, and oils. Their outstanding characteristics give them great versatility in method of use because of the high degree of porosity and the many types of felt constructions available.

For complete details write, on your company letterhead, for FREE, 10-Page Data Sheet No. 17 on "Wool Felt-Liquid Filtration". And remember: American Felt Company also produces engineered Synthetic Fiber Filter Felts.

Directly above is a microscopic (175x) view of wool felt demonstrating the filtration mechanism attributed to the Van der Wall Forces. Note how solids smaller than pore size (in red) are held on the fiber by molecular attraction; with minimum flow resistance and freedom from plugging.. **SEND TODAY for this FREE, 10-Page Data Sheet No. 17. Please make request on company letterhead.**

American Felt Company

TRADE MARK

GENERAL OFFICES: 80 GLENVILLE ROAD, GLENVILLE, CONN.

SALES OFFICES: New York, Boston, Chicago, Detroit, Cleveland, Rochester, Philadelphia, St. Louis, Atlanta, Greenville, S.C., Dallas, San Francisco, Los Angeles, Portland, San Diego, Seattle, Montreal.—PLANTS: Glenville, Conn.; Franklin, Mass.; Newburgh, N. Y.; Detroit, Mich.; Westerly, R. I.—ENGINEERING & RESEARCH LABORATORIES: Glenville, Conn.

For more facts circle 524 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

PVC Pipes Muriatic Acid

UNPLASTICIZED polyvinyl chloride pipe and fittings are successfully handling muriatic acid in an eastern steel mill at 1/6 the cost of other corrosion resisting materials used for acid conveying lines in the same mill.

The PVC pipe, which is 1/6 the weight of metal pipe, is used to convey 20 deg Baume' muriatic acid at ambient temperatures between the terminal pit and cleaning house.

PVC piping has proved easier and cheaper to install than both metal and rubber-lined pipe. Since it required no welding or bolting, there were savings in labor and in the original cost of fittings.

Fittings are of the socket-type that are installed by brushing a solvent cement on the pipe and fitting, and pushing them tightly together. They include 45 deg and 90 deg elbows, tees, reducer bushings, caps, couplings, blind flanges and companion flanges.

Valves in the system are threaded and used with Schedule 80 pipe.

The piping system starts at the terminal pit where incoming tank trucks pump acid into the storage tank inlet pipe. Compressed air forces the acid through the line at a pressure of 30 psi.

This pipe, 2-in. PVC, goes underground to a depth of 3 ft and, inside a 6-in. steel pipe, spans a 40-ft wide roadway traveled by trucks and industrial locomotives. It rises out of the ground on the other side of the roadway and leads into the acid storage tank alongside the cleaning room.

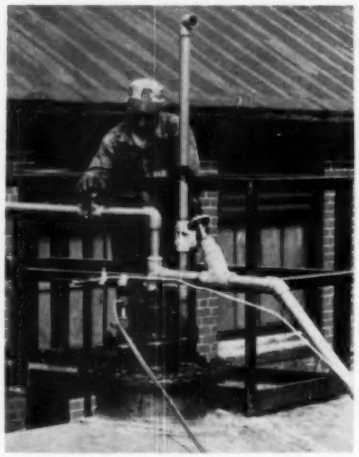
Lines coming out of the tank are 1½-in. ID. One, the outlet pipe, carries acid to the cleaning room; the other, a 1½-in. pipe, serves as a vent line for released air pressure.

At the point where the pipe enters the cleaning room, it drops to 1-in. ID. It is to this PVC pipe that the portable acid hoses for filling the acid tanks are attached. An auxiliary 1-in. line is used to fill trucks carrying acid to other points in the mill.

There is a small section of ½-in. pipe used on the liquid level gage which records the amount of acid in the tank.

All of the valves in the piping system are made entirely of PVC except four which are diaphragm valves. In the case of these four valves, the bonnet and the handwheel are made of steel, and the body of PVC. This type of construction makes it possible to remove the bonnet and replace a dia-

(Continued on page 38)



Polyvinyl chloride pipes and fittings are used in steel mill for conveying acid

Cranberries Travel by Airstream, Reducing Costs and Damage

AN AIR-CONVEYING system has provided a 90 per cent reduction in the cost of handling frozen cranberries for the Onset (Mass.) plant of National Cranberry Association. The streamlined system, which moves the berries from a storage freezer to the plant where they are processed needs only two men working half time to supply the 1,000-barrel a day capacity of the canning machines. In addition, berry damage formerly caused by hand labor has been cut in half.

Cranberries enter conveyor through intake nozzle, travel through stainless pipe to receiver and pre-process bin

The year around processing of a seasonal product introduces the problem of storage. For cranberries, this storage had to be in a freezer. Construction of a 60,000-bbl storage freezer in 1954 alleviated the heavy cost of transportation and away-from-the-plant storage, but created new in-plant handling difficulties.

A complex handling procedure, using nine men eight hours a day, was barely able to move the quantity of berries needed to keep the machines supplied. Half-barrel containers were filled manually with frozen cranberries in the freezer, then stacked on 20-box carts. The carts were placed on a truck, which was moved 500 ft from the freezer building to the cannery where the boxes were unloaded and the cranberries emptied from the boxes into the pre-process storage bin. Furthermore, the empty boxes had to be moved, stored and maintained.

A rotation of workers had to be arranged so that the men would not have to remain in the —15 F to —5 F temperature of the freezer for more than one-half hour at a time.

Using an Airstream conveyor intake nozzle and flexible hose in the freezer, two men now move enough frozen cranberries in four hours to supply the daily needs and keep the 200-bbl emergency storage bin in the canning building full at all times.

Frozen cranberries are drawn into the conveyor through the intake nozzle, guided by one man. They are then whisked a distance of 400 ft through the conveyor pipe to a receiver which separates the berries from conveying air. A rotary feeder discharges the berries from the receiver into the pre-process storage bin.

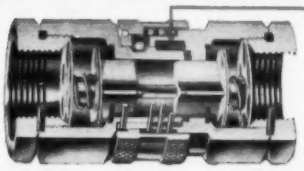
The entire system is made of stainless steel. The smooth interior of the conveying line minimizes damage to the berries, while the blast of air keeps the inside of the system clean. *From a release of Dracco Corp., Cleveland, Ohio.*

WHICH SNAP-TITE QUICK-CONNECT COUPLING IS BEST FOR YOU?

SNAP-TITE "H" COUPLING . . . . . FOR HIGH PRESSURE APPLICATIONS

FOR HYDRAULIC OR AIR

"H" Coupling for high strength, higher efficiency, high-resistance to heavy line surge. Sizes: ⅛" thru 12". Bulletin No. 240

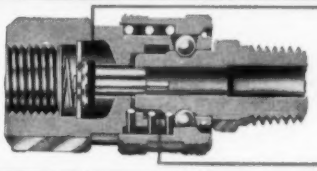


Exclusive U-packer gives a positive seal without compression set because of rubber distortion. Line pressure inside the U-packer keeps it open and forced against its metal backing—the higher the pressure, the tighter the seal.

SNAP-TITE HI-FLOW COUPLING . . . FOR LOW PRESSURE APPLICATIONS

FOR AIR AND FLUIDS UP TO 150 p.s.i.

Hi-Flow is recommended to connect small air tools to plant air system, and for low pressure fluid transfer in small lines. Sizes: ⅛" thru ¾". Bulletin No. 230

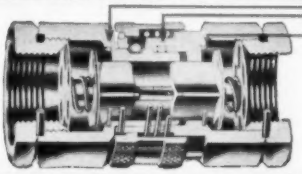


Bonded valve washer
(pat. pending on valve construction)

Exclusive U-packer

SNAP-TITE "HK" COUPLING . . . . . FOR HARD TO HANDLE FLUIDS

FOR FUMING ACIDS, ALKALIES, SOLVENTS, AND HIGH PRESSURE STEAM . . . "HK" is the only coupling now on the market for fluid temperatures from —100° F to +500° F . . . and for live steam up to 460° F. Its seals are made of Teflon for which there is no known solvent. Sizes: ½" thru 3". Bulletin No. 270



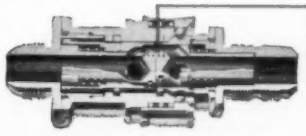
Teflon Valve Seal

Teflon Nipple Seal

Teflon Valve Seal

SNAP-TITE NO-SPILL COUPLING . . . FOR MINIMUM AIR INCLUSION

FOR AIRCRAFT, MISSILE HYDRAULIC, FUEL SYSTEMS which cannot stand air in the lines, and for transmitting fluids which *must not spill*, the Snap-Tite no-spill coupling is recommended. Bulletin No. 280

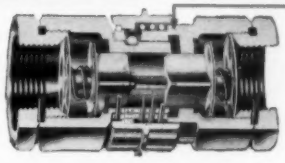


Flush valves prevent spillage, air inclusion. Snap-Tite will engineer special variations to your requirements.

SNAP-TITE "E" COUPLING . . . . . FOR VACUUM and VERY LOW PRESSURE

FOR VACUUM SYSTEMS IN THE MICRON RANGE

"E" Coupling performs in the *micron* range in the smaller sizes both connected and disconnected. Recommended, too, for gravity flow . . . U.L. approved for LP Gas. Sizes: ⅛" thru 12". Bulletin No. 250



Nipple seals in coupler by depressing the lip of the E packer and slightly compressing the body of the packer. This new E-packer gives positive seal under high-pressure, low-pressure, and vacuum.

Snap-Tite Couplings are available plain, (without valves), and with either single or double shut-off. Couplings normally furnished in alloy steel, but all (except hi-flow) are also available in brass, aluminum, or stainless steel with a variety of finishes.

Snap-tite

SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

SNAP-TITE, INC., UNION CITY, PA.

For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

phragm without taking the valve from the line. *From a release of Alloy Tube Div. of The Carpenter Steel Co., Union, N. J.*

Au Secours! *

THERE IS DATA to demonstrate that lives have been lost in disasters such as fires, vehicular accidents, mine cave-ins, building and machinery collapses, because effective extrication tools were not available.

To help provide greater speed and margin of safety than that given by tools such as prybars, hacksaws and similar tools, kits of hydraulically operated equipment designed for use in rescue work are in use by industrial plant rescue teams.

Basic rescue kits, in 4-, 10- and 20-ton power packages, include a hand-operated pump and ram, joined by a flexible hose, which permits remote control of the ram. Attachments for lifting, pushing, pulling, spreading, clamping and pressing can be threaded on to the ram. *From a release of Blackhawk Manufacturing Co., Milwaukee, Wis.*

* For those who have not recently referred to a copy of "Berlitz French for Travelers—Self Pronouncing," this may be freely translated as "Help!" A more elegant rendering would be "To the rescue!"

Two-Way Radio Aids Refinery Maintenance

DESIGN ENGINEERS planned two jobs for radio in the 900-acre plant of the General Petroleum Corp., in Ferndale, Washington. These jobs are dispatching the trucks that shuttle parts and material about the refinery and keeping in touch with key personnel whose duties take them away from their desks and telephones.

The system which fulfills these requirements consists of a single fixed radio station manned around the clock, working into 20 cars and trucks in four categories: Maintenance; operating; tool and material delivery; and emergency.

All stations, both mobile and base, (all rated at 18 to 20 watts RF output) are tuned to a common frequency of 451.45 mc. This permits two-way communication from base to mobile stations as well as mobile to mobile.

Two-way radio in car of maintenance superintendent keeps him available to, and in touch with refinery personnel

The base station and antenna stand 290 ft above ground, giving line of sight coverage for 12 to 15 miles in all directions.

Since most calls concern maintenance, the base station dispatching is handled in the Maintenance Shop office during the day, but at night is

(Continued on page 40)

Reminder on How to Select a Fire Extinguisher

Courtesy Fire Equipment Manufacturers' Association

Class of Fire	Carbon Dioxide	Dry Chemical	Vaporizing Liquid	Foam	Soda Acid	Water
Class A Paper, wood, excelsior, rubber etc. require cooling, quenching.	Small surface fires only	Small surface fires only	Small surface fires only	**Yes** Foam clings to vertical surfaces, wets and smothers.	**Yes** Soda-acid is economical protection; quenches and cools.	**Yes** Water is excellent protection; it cools and quenches.
Class B Burning liquids (gasoline, paint, oil, grease, etc.) need smothering.	**Yes** Has no ill effects on food and leaves no residue.	**Yes** Chemical smothers fires	**Yes** Vaporizing liquid is converted into a gas which smothers the fire.	**Yes** Heavy foam blanket on surface of burning liquids smothers.	**No** Basic water content will spread liquid fires.	**No** Water will spread fire, not put it out.
Class C Live electrical fires (motors, switches, appliances, etc.). Use non-conducting extinguishing agent.	**Yes** Carbon dioxide is non-conductor; will not damage costly electrical equipment or leave residue.	**Yes** Dry chemical is non-conductor of electricity.	**Yes** Liquid is non-conductor, and will not damage equipment.	**No** Foam is a conductor and should not be used on electrical equipment.	**No** Should not be used on live electrical equipment; basic water content will conduct.	**No** Water, a conductor, should not be used on live electrical conductor.
Subject to Freezing	No	No	No	No	No	Yes, unless chemical is added.
Extinguishing Agent	Carbon dioxide	Dry chemical	Heavy vapor formed	Foam bubbles	Soda solution and acid	Water
Range	5-10 ft	10-25 ft	20-30 ft	25-35 ft	30-40 ft	35-50 ft
Effect on Fire	Smothers	Smothers	Smothers	Smothers and cools	Cools and quenches	Cools and quenches

IT'S EASY to reduce annoying and expensive oil leakage like that shown here. The simple act of switching to a Suntac oil – *without making any other changes* – can cut leakage an average of 35%...sometimes 90%!

SUNTAC STOPS SHUTDOWN CAUSED BY OIL LEAKAGE

A manufacturer was having trouble with oil leakage and throw-off from bearings of overhead shafting. This resulted in hazardous conditions and low employee morale. Production had to be shut down frequently. Oil costs were high.

A switch to a Suntac® lubricating oil solved these problems.

If you're losing oil through excessive leakage from rotating or sliding parts, a Suntac oil can cut your consumption an average of 35%. These oils are especially compounded to reduce drip, throw-off, squeeze-out; their greater adhesiveness enables them to cling firmly to the parts...as they lubricate.

Suntac oils can reduce consumption up to 90% when used in hydraulic systems, circulating systems, and in other continuous use applications.

For further information on versatile Suntac oils, see your Sun representative or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-11.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY Philadelphia 3, Pa.

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IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

For more facts circle 526 on Reply Card

want quality slings?

The slings you use have to be the best. There's too much at stake—the safety of your crew, your equipment and the material they're handling. How can you make sure that the slings you have are the best available? Ask your supplier these questions:

Does the maker produce his own steel?

Then does he carefully test the results?

Does he process this superior steel into top-quality wire?

Then does he carefully test the results?

Does he make this superior wire into top-quality wire rope?

Then does he carefully test the results?

Does he fabricate this superior wire rope into top-quality slings?

Then does he carefully test the results?

If you receive even a single "no", it'll pay you to get the Wickwire story . . . to see how Wickwire Wire Rope Slings are made—from blast furnace to testing of the completed sling—by a *single* company with over a century and a quarter of wire-making experience. Contact the nearest sales office below today.

CF&I

WICKWIRE
WIRE ROPE SLINGS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION 4236

THE COLORADO FUEL AND IRON CORPORATION—Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City Tulsa • PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) New Orleans • New York • Philadelphia • CF&I OFFICES IN CANADA: Toronto • Montreal

For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

switched to the Main Gate office where plant guards take over the dispatching duty.

Normal channel for radio calls is from a maintenance foreman or construction supervisor to the base station, which relays the message to the mobile unit required.

Frequent calls are made to the tool and parts pick-up truck and to the maintenance foreman who has charge of maintenance equipment and labor crews. Use of the radio truck allows the maintenance foreman to transmit messages to each crew without the necessity of driving to each crew in person.

In the event of a fire, all radio trucks follow an emergency procedure, switching to listening standby status in order to keep the air channel clear for priority calls. *From Motorola Newsgram, published by Motorola Inc., Chicago, Ill.*

Time Changes

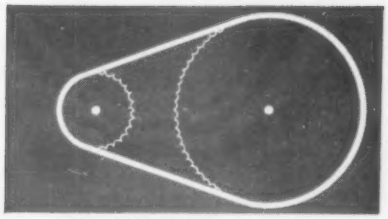
A DEVICE for resetting the three king-size clocks on the plant walls in a matter of minutes, has been made by D. W. Shope, maintenance electrician on time clocks in our plant.

Made from scrap materials and employing a make and break switch, the portable impulse power supply device makes it possible to tap into the electrical outlet of the clock at floor level. Each time a trigger in the device is pressed, the clock hands move forward one minute.

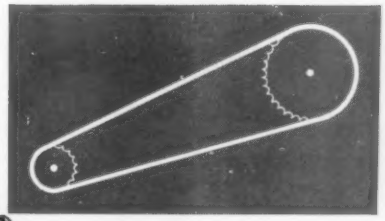
Portable impulse power supply device makes possible resetting of plant clock, seen in background, in few minutes

Formerly, when a local power failure stopped a clock, it required the services of two men, using a 40-ft extension

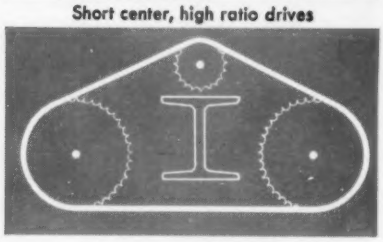
VERSATILE DIAMOND CHAINS SOLVE MANY DRIVE PROBLEMS AT LOW COST...



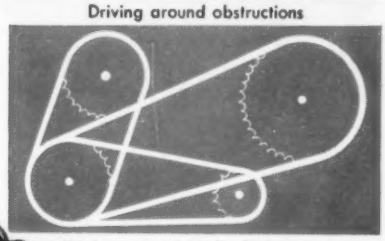
Short center, high ratio drives



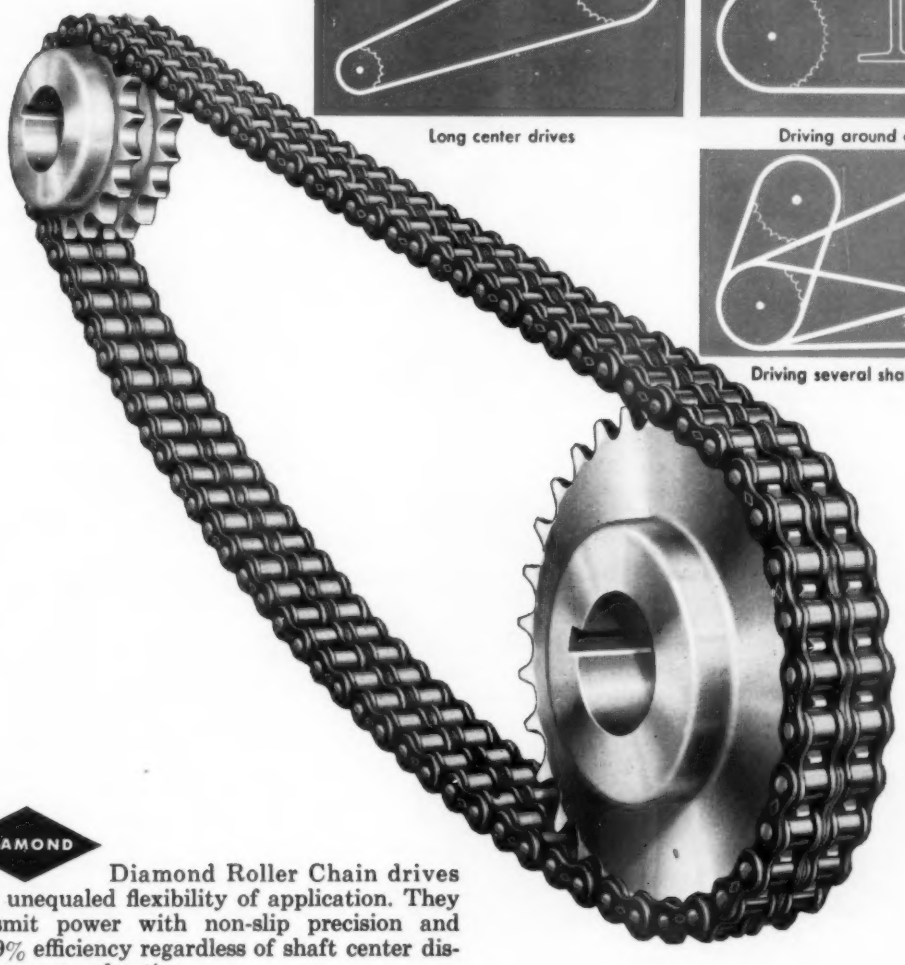
Long center drives



Driving around obstructions



Driving several shafts from one source



DIAMOND

Diamond Roller Chain drives offer unequaled flexibility of application. They transmit power with non-slip precision and 98-99% efficiency regardless of shaft center distances or speed ratios.

Obstacles in the drive path are easily avoided. Diamond Roller Chain's light weight and compactness allow lighter machinery construction, eliminate power consuming gear trains and the many shafts and bearings they require.

Diamond Engineers are available now to help you solve your drive problems. Write or call today.

DIAMOND CHAIN COMPANY, Inc.
Dept. 614, 402 Kentucky Ave., Indianapolis 7, Indiana
Offices and Distributors in all Principal Cities
Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

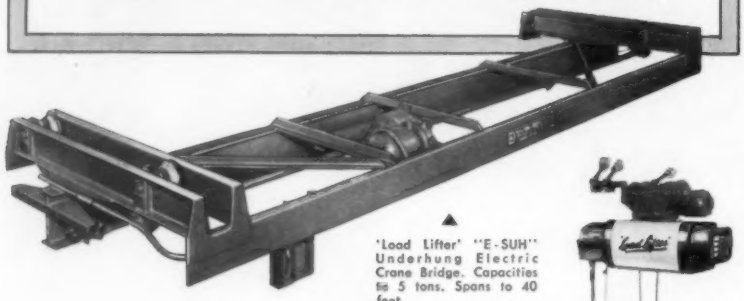
Where High Quality is Traditional

For more facts circle 528 on Reply Card

LOW-COST

'LOAD LIFTER' CRANE UNIT

BOOSTS PRODUCTION IN PLANTS
FORMERLY WITHOUT CRANE SERVICE



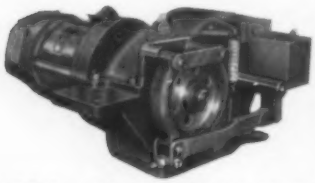
'Load Lifter' "E-SUH" Underhung Electric Crane Bridge. Capacities to 5 tons. Spans to 40 feet.

'Load Lifter' Electric Hoist with motor-driven trolley is ideal for use with the "E-SUH" Crane Bridge.

Load-handling efficiency and economy can now be increased tremendously in many plants still lacking crane service. The solution is the 'Load Lifter' "E-SUH" Underhung Electric Crane Bridge, plus an electric hoist with motor-driven trolley.

This crane bridge was developed specifically for use where the structure of the building lends itself to the support of crane runways on the roof trusses or ceiling. Because the runways consist of two parallel I-beams, they are inexpensive to install. The crane bridge is available in capacities up to 5 tons and spans up to 40 feet. Rugged construction provides end trucks that do not spread, and an auxiliary truss on the machinery side prevents "whipping".

If you have denied yourself the cost-cutting advantages of electric crane service because of the structural characteristics of your plant, learn all about the 'Load Lifter' "E-SUH". *Call your Industrial Supply Distributor or write for Catalog 218C.*



Speed Reducer Unit. Self-contained and directly connected to motor which has integral electrically-operated motor brake. Drive shaft extends full bridge length and is geared to driving wheels. Ball bearings in speed reducer and bridge wheels assure low operating and power costs.

End Truck. Heavy steel "U" plates at each end effectively prevent trucks from spreading. Bridge wheel axle bearings are heavy steel slabs welded to trucks — assure permanent alignment and rigidity.

MAXWELL MANNING & MOORE INC. M&M TRADE MARK

'Load Lifter'® UNDERHUNG ELECTRIC CRANE BRIDGES

MANNING, MAXWELL & MOORE, INC.

MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

For more facts circle 529 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

ladder, for two hours to complete job of restarting any one of the clocks. *From Southern Star, published by Lockheed Aircraft Corp., Georgia Div., Marietta, Ga.*

Man's Best Friend — For Work

TRACING OF LEAKS in the pipes of underground gas mains systems is usually carried out with the aid of a leakage detector, involving a considerable amount of time, especially if the entire system is to be inspected. In the Municipal Gas Undertaking of Utrecht, Holland, inspection is now carried out by a dog.

The dog employed, an Alsatian, was

given special training for three months. He was taught to fetch and carry, seize and hold, etc., also to track down rags permeated with the smell of gas. The dog must also have a skilled guide to work with.

In tracing the leaks it is important that the dog and guide should not be distracted, and for this reason, inspection is carried out before 8:00 a.m. It requires about 50 min to inspect approximately 800 yds of pipe line. Inspection of the same length of pipe with a leak detector would require the services of four men for one day.

If no leaks are found by the dog, the cost of inspection amounts to only one-third of the customary method. If leaks are found, they must be further localized by means of the leak detector and the concentration of gas in the earth must be measured. With two workmen needed for this job, the cost is still considerably below that of the old method. Another advantage is that street paving is not damaged unnecessarily.

It has been found that the specially trained dog shows a great sensitivity to the smell of gas and in fact, will sometimes turn aside from the indicated path in order to point out leaks

How it Works!

Only new Sarco TD steam trap uses kinetic energy of steam to close valve

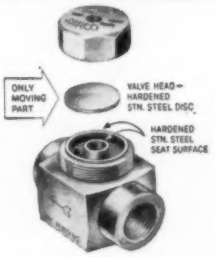
GAS MANTLES have been replaced by electric lights, steam locomotives by diesels, propeller planes by jets.

Now, the use of the kinetic energy of steam principle gives us a modern type of steam trap.

The Sarco TD obsoletes all other types for most 10 to 600 psi installations. For example, it operates without a valve closing device—no bucket, float, bellows, pins, levers or gaskets.

Glance below and you'll agree that no other steam trap is even similar to the Sarco TD!

For a trial installation—write today.



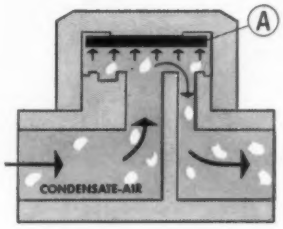
Only 3 parts... all stainless steel

Sizes ⅜ to 1"—each body is as small as a tee fitting! Capacity is determined not by a bulky body but by the effective orifice, valve action, pressure drop and condensate temperature.

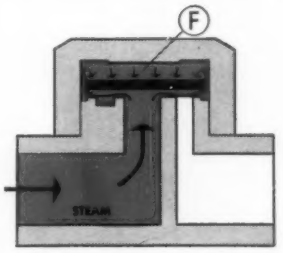
Many Advantages

1. *Practically no maintenance*—no valve mechanism, no narrow channels. Trouble-free simple design. Only 3 parts—all stainless steel.
2. *One trap for all pressures*—self-adjusting. One large capacity seat for 600 psi as for 10 psi. No changes or adjustments.
3. *Operates equally well on all loads*—on heavy, light or no condensate load. No prime to lose. No adjustments.
4. *No steam leak required*—to operate the Sarco TD. Closes tight against steam.
5. *Discharges at steam temperature and vents air* and air-steam mixtures at start-up and during operation.
6. *Freeze-proof*—when installed with outlet down, free to drain.

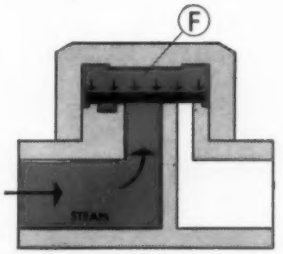
Only Sarco TD Thermodynamic Steam Trap Uses This Unique Operating Principle Which Permits Trouble-Free TD Design



1. Inlet pressure raises disc "A" from seat... immediate discharge of air and condensate at steam temperature.



2. Steam follows the condensate and the high velocity jet across the bottom of disc "A" creates a low pressure area (Bernoulli effect)... the jet is deflected into chamber "F" where it builds up pressure by recompression and this pressure acts on the top of the disc "A"...



3. Pressure in chamber "F", acting on full top area of disc "A", exceeds force of incoming steam and low pressure area under the disc... and immediately forces it down, closing the inlet. As condensation decreases the pressure in chamber "F", the disc rises and steps 1 or 2 repeat.

60-day trial convinces... No obligation... Use coupon!

SARCO

Steam Traps—Temperature Regulators—Strainers—Heating Specialties

SARCO COMPANY, INC., Empire State Bldg., New York 1, N. Y.

Please send me Sarco TD Steam Trap and strainer for 60-day trial. Size_____

For installation on_____

Name_____ Title_____

Firm_____

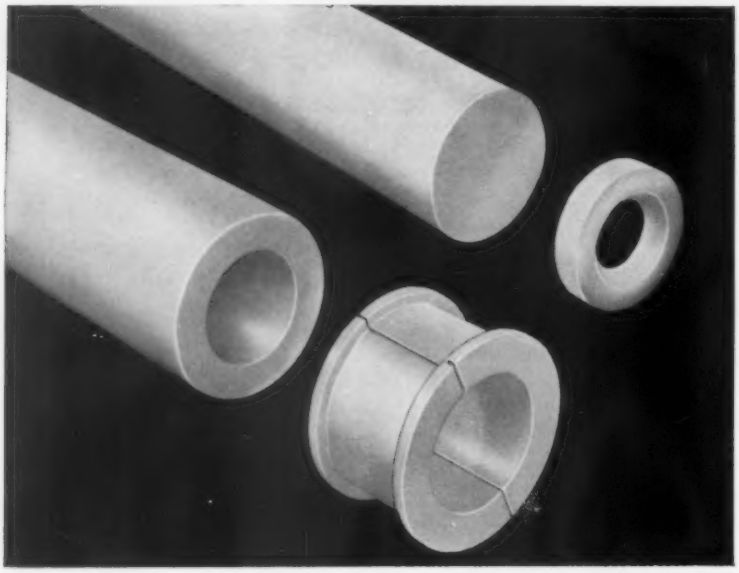
Address_____

City_____ State_____

2184-C

For more facts circle 530 on Reply Card

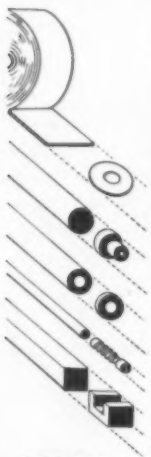
Tough, Low-Cost Maintenance Parts Machined from POLYPENCO® NYLON



High Quality Nylon in Convenient Shapes Gives Maintenance Men Ready Source for Wide Variety of Parts

Above are two Polypenco Nylon Stock Shapes and parts machined from them. Machining was done on standard metalworking tools . . . rapidly, simply, and to close tolerances.

Maintenance men are recognizing the advantages of applying parts made from Polypenco Nylon, such as this valve seat and split bearing. Nylon's resiliency, long-wearing and low friction characteristics are also advantageously employed in bearings, bushings, gears, rollers and other parts.



The use of Polypenco Nylon parts for maintenance applications saves downtime, provides longer wear life, increases production efficiency.

FABRICATE ON STANDARD METALWORKING EQUIPMENT

You can use your own machine tools to turn, tap, thread, mill, etc. in rapid, low-cost machining that assures precision and production under your complete control.

POLYPENCO IS HIGHEST QUALITY NYLON

You get the benefit of all of nylon's desirable qualities in Polypenco Nylon Shapes because it's made under rigid controls with uniform density, dimensional stability and freedom from porosity and stress spots.

Polypenco Nylon is available in principal cities in these shapes for immediate delivery: Rod, Tubular Bar, Tubing, Strip or Slab. For helpful data on machining nylon, write today for technical Bulletin No. 8.

THE POLYMER CORPORATION OF PENNA. • Reading, Penna.
Export: Polypenco, Inc., Reading, Penna., U.S.A.

POLYPENCO Nylon, Teflon†, Q-200.5 (cross-linked polystyrene) and K-51 (chlorinated polymer)

*PATENTS APPLIED FOR
†DU PONT TRADEMARK

For more facts circle 531 on Reply Card

PLANT ENGINEERS' DIGEST

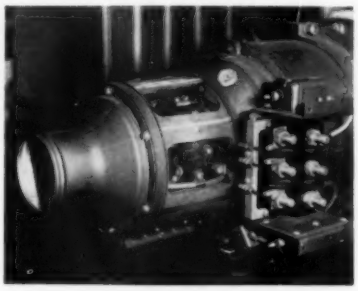
(Digest begins on page 36)

in branch pipes. Some deduction about the extent of the leak can be made from the manner of the dog's reaction. In the case of a small leak, the dog stops and stands still; when the leak is fairly large, he barks; and when the leak is very large, he scratches the earth with his paws.

Use of the dog in tracing leaks is limited to those cases where escaping gas can find an outlet to the street. *From Het Gas, published in Holland.*

Inspection Through Plastic

USE OF A PLEXIGLAS air blast cover installed over the commutator of a generator has proved to be of great assistance in conducting operational



Inspection is easy through plastic cover

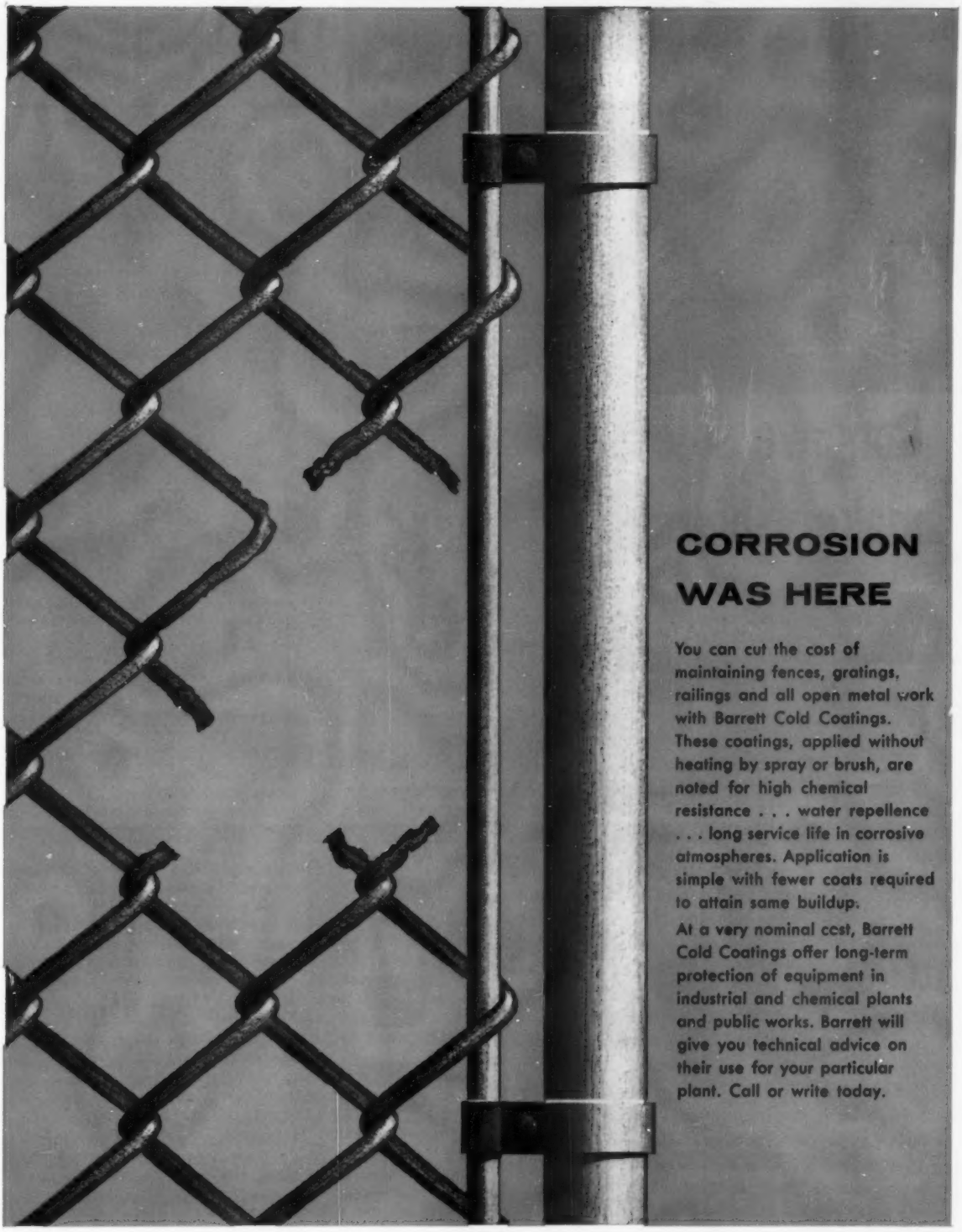
tests. The arcing between the brushes and commutator can be visually observed at all times. Any commutation trouble is quickly detected, resulting in a greater saving of time and more thorough inspection.

This method has corrected many deficiencies encountered in the former method, where the solid air blast cover was removed for short periods of time during the tests. This resulted in insufficient inspection of commutation and possible overheating of the generator, since removal of the cover diverts the cooling air flow. *From a release of Glenn L. Martin Co., Baltimore, Md.*

Lead Floors For Safety, Protection

BECAUSE LEAD has the ability to absorb shock and is non-sparking, it is used as a floor covering in strategic areas throughout the nitro-glycerin manufacturing and storage building of the Atlas Powder Co., Wilmington, Del.

Usual practice is to use 6-lb sheet



CORROSION WAS HERE

You can cut the cost of maintaining fences, gratings, railings and all open metal work with Barrett Cold Coatings. These coatings, applied without heating by spray or brush, are noted for high chemical resistance . . . water repellence . . . long service life in corrosive atmospheres. Application is simple with fewer coats required to attain same buildup.

At a very nominal cost, Barrett Cold Coatings offer long-term protection of equipment in industrial and chemical plants and public works. Barrett will give you technical advice on their use for your particular plant. Call or write today.

Barrett®

PROTECTIVE COATINGS

BARRETT DIVISION, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N.Y. In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

OVER 100 YEARS OF EXPERIENCE

Allied Chemical

For more facts circle 532 on Reply Card

Concave sides make V-belts last longer

The sides of every Gates V-belt (Fig. 1) are concave—a precisely engineered curve that greatly increases V-belt life. Here's why:

On the bend around the sheave, the concave sides of a Gates V-belt fill out and become straight (Fig. 1-A). Thus the belt makes full contact with the sides of the sheave, grips the sheave evenly, and wear is distributed evenly across the sides of the belt. Uniform wear lengthens belt life; keeps costs down.

Make this simple test

Take a straight-sided belt (Fig. 2) and bend it. Feel the sides at the bend; they bulge out. Now picture this bulge in the sheave groove (Fig. 2-A). It is easy to see that the belt makes uneven contact at points indicated by arrows. Naturally, wear is greater at these points. Uneven wear shortens belt life; increases belt costs.

Cut down-time and V-belt replacement costs. Specify belts that grip evenly and wear longer . . . specify Gates Vulco Rope—the V-belt with concave sides. There is a Gates distributor nearby who will quickly supply the belts you need. The Gates Rubber Co., Denver, Colorado

—World's Largest Maker of V-Belts

TPA 88

Gates Vulco Rope Drives

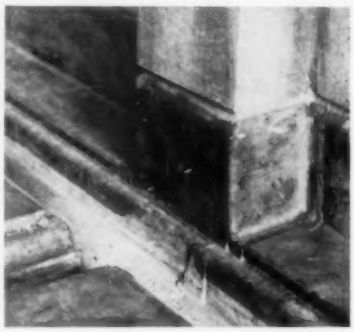
For more facts circle 533 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

lead for floor coverings and up to 16 lb sheet for some special applications. In installation, lead is extended up the side wall for varying distances. All vessels in the area or piping passing through the floor have lead boots or aprons. Joints are lead welded.

In locations where particularly sensitive materials are handled, lead floor coverings are properly grounded to provide satisfactory protection against the possible generation of hazardous static energy levels.



Part of new floor and T gutter, with lead extended several inches up the wall

The floors are easily cleaned by hosing and have a relatively low yearly maintenance cost.

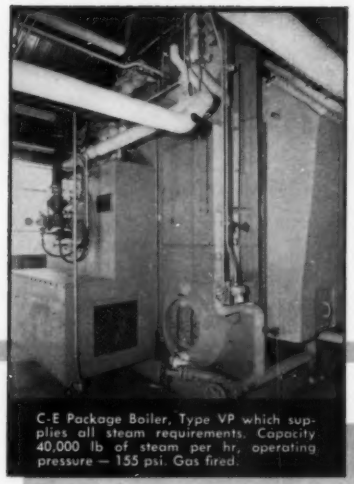
Experience has indicated that lead floor covering protects normal structural materials such as wood and steel from acids used in the process and prevents contamination of these structural materials with the explosive products. *From Lead, published by Lead Industries Association, New York, N. Y.*

Comparative Heat Reflectivity

TESTS CONDUCTED in our laboratories showed that, of three different materials, aluminum coated sheet steel, firebrick and porcelain enameled iron, the aluminum coated steel showed the highest degree of heat reflectivity.

Three experimental chambers, one of each material, were constructed. Indentical heating elements introduced equal heat into the three chambers and readings of inside temperatures were recorded at intervals of seven hours.

Data showed that the aluminized steel chamber heated faster than the other two, reaching and maintaining a considerably higher temperature. *From a release of Armco Steel Corporation, Middletown, Ohio.*



C-E Package Boiler, Type VP which supplies all steam requirements. Capacity 40,000 lb of steam per hr, operating pressure — 155 psi. Gas fired.

"RELIABLE—ECONOMICAL —LOW ON MAINTENANCE"

Says Mr. Max R. Spencer—Superintendent Central Soya Co., Inc.—McMillen Feed Mills

From an original water color of the Central Soya Co., Inc. — McMillen Feed Mills by Kent Day Coes. Commissioned by "Factory" magazine for their 1956 Significant Plant Awards.

"Our package boiler, after 18 months of operation, has proven to be very reliable, economical and low on maintenance costs. Ease of start-up, shut-down and continuous operation permitted quick training for our operators."

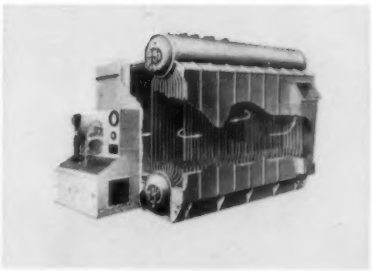
Mr. Max R. Spencer, Maintenance Superintendent of the Central Soya Co., Inc.—McMillen Feed Mills—of Chattanooga, Tenn., was referring to his C-E Package Boiler, Type VP, when he made that statement.

It's a boiler that has to be good—has to be reliable—for it is presently the sole source of steam supply for this outstanding plant. And it *is* an outstanding plant having been named one of "The 1956 Winners of Factory's Significant Plant Awards."

Central Soya is a real, modern "triple threat" operation. It comprises: (1) mammoth new grain-handling elevators, (2) feed mill, and (3) soybean solvent extraction plant all integrated into a smoothly operating "continuous process" plant that is expandable and ready for any foreseeable need.

Combustion Engineering is proud that its VP Package Boiler has been assigned a key role in the operating plan of this notable mill. Gratified, too, that it is proving to be all that Mr. Spencer had hoped for.

A C-E Package Boiler, Type VP can do the same kind of a job for you. Let us give you more information.



Cutaway view of typical VP Boiler. For capacities from 4,000 to 40,000 lb of steam per hr. Pressures to 500 psi. Oil or gas fuel.

COMBUSTION ENGINEERING

C-E

B-962A

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.
CANADA: COMBUSTION ENGINEERING-SUPERHEATER LTD.

Steam Generating Units • Nuclear Reactors • Paper Mill Equipment • Pulverizers • Flash Drying Systems • Pressure Vessels • Home Heating and Cooling Units • Domestic Water Heaters • Soil Pipe

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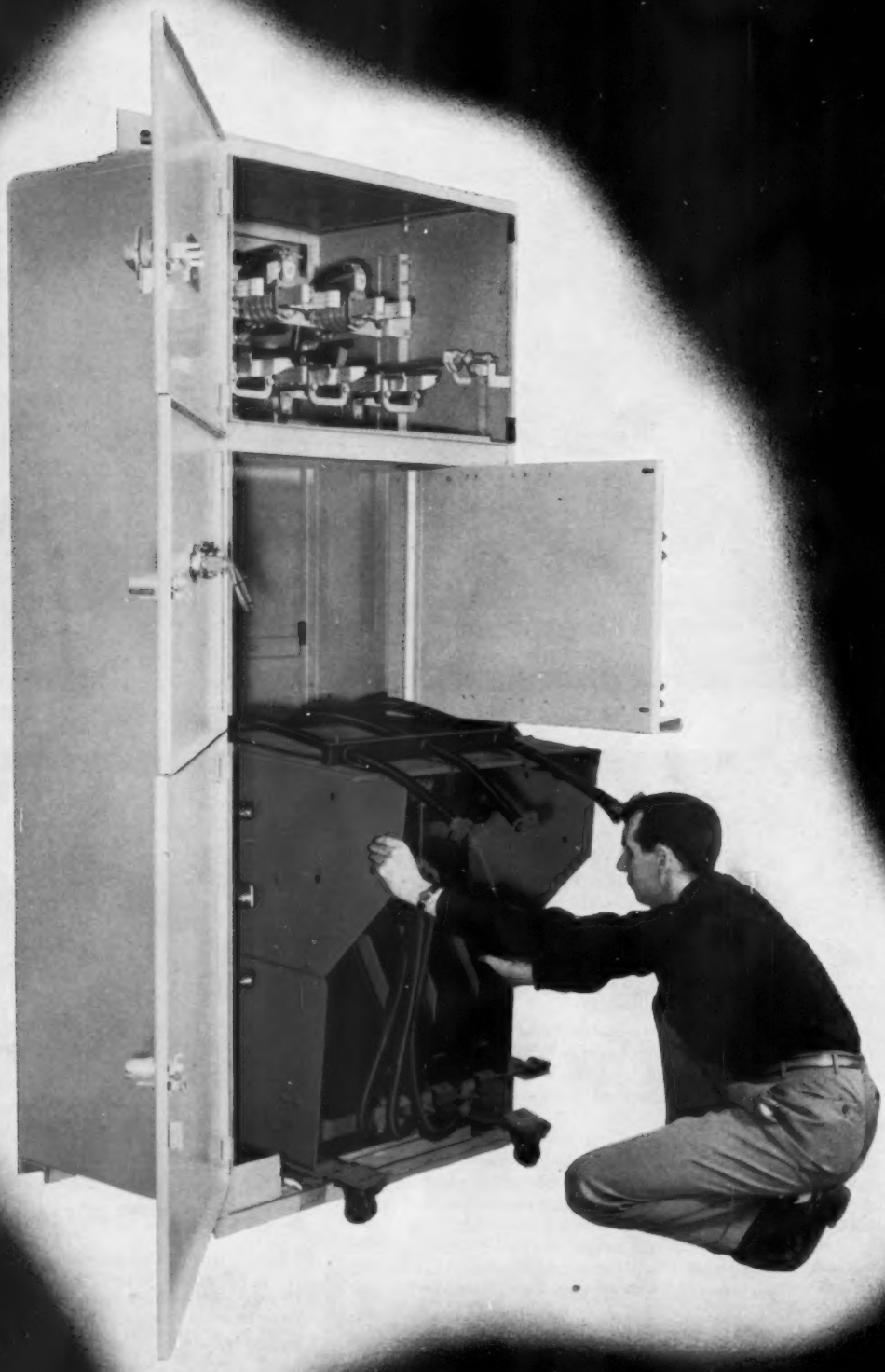
HIGH-VOLTAGE MOTOR CONTROL.....



GENERAL ELECTRIC LIMITAMP* STARTERS OFFER ROLL-OUT CONTACTOR UNITS FOR EASIER INSTALLATION

Today's General Electric Limitamp starters are designed to bring you the utmost in installation ease, speed, and economy.

Key feature of this cost-cutting design is the caster-mounted contactor unit which can be easily rolled into or out of the Limitamp enclosure. After swinging out the hinge-mounted low-voltage panel, and before rolling in the contactor unit, the installation man can walk right inside the enclosure to make connections quickly and conveniently.

Once connections are completed, the panel can be closed and ready to operate within seconds. Limitamp panels control and protect motors rated 2300 to 4800 volts and ranging up to 3000 horsepower.

MORE LIMITAMP CONTROL FEATURES

Fast, economical installation is but one benefit of General Electric Limitamp control. There are many more. For instance:

- Five-square-foot saving of floor space through use of higher-capacity fuses to eliminate need for an extra fuse cabinet.
- Increased personnel safety provided by three-phase disconnect switch.
- Flexible arrangement of units and added space savings, with all connections made from front.
- Complete range of modifications to meet any installation requirement.

REALIZE THESE BENEFITS NOW

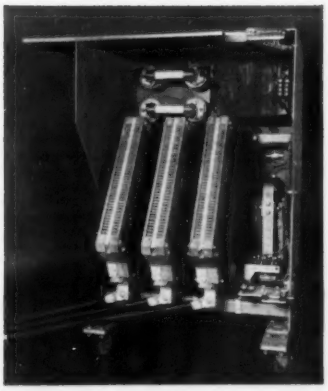
Don't be satisfied with "old-fashioned" high-voltage motor control: Specify General Electric's Limitamp control—*leader in design and performance*. Contact your G-E Apparatus Sales Office today, or write Section 783-2, General Electric Company, Schenectady, New York.

Industry Control Department, Roanoke, Virginia.

*Reg. Trade-mark of General Electric Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC



MAINTENANCE EASY on contactor; generally devices are front-removed.

THERE'S AMPLE SPACE to stand inside enclosure and make necessary connections. Yet entire control requires 50% less floor space than before.

POWER of a giant

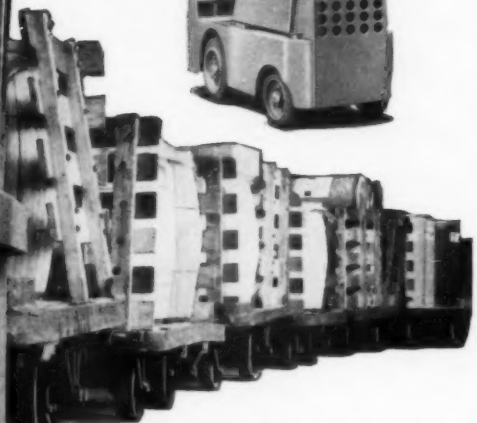
. . . but a PYGMY in size!

MERCURY "BANTY"

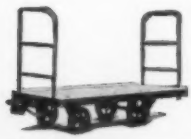
Model 460, 4-Wheel Gas Tractor

With a turning radius of only 62½" and overall dimensions of 78¾"x41"x 56½", the MERCURY "Banty" is the most versatile . . . maneuverable . . . and dependable tractor made. Typical of the important economies possible with this unusual machine is the experience of one large company that moves over 4,000,000 lbs. per day with a "Banty" and train of trailers at a cost of less than 6c *per ton.*

Model 460 "Banty" is available in two models for regular or LPG operation—Standard 2400 lbs. or Heavy Duty 3000 lbs. D.B.P. Request Bulletins T-101 and T-102.



If you are moving large volumes of materials over long distances it will pay you to investigate the handling economies of the MERCURY "Banty" and the "Trackless Train" system.



MERCURY A-310 TRAILER
Burden carrier of the "Trackless Train"

MERCURY
FORK TRUCKS · TRACTORS · TRAILERS

MERCURY MANUFACTURING COMPANY
4002 S. Halsted St., Chicago 9, Ill.

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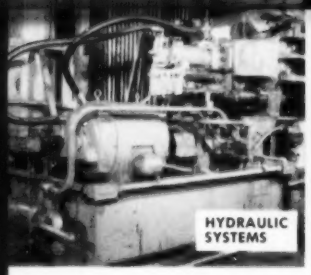
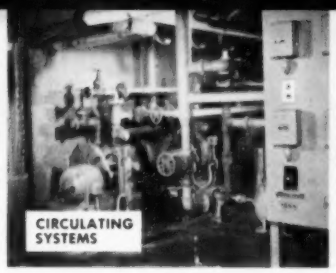
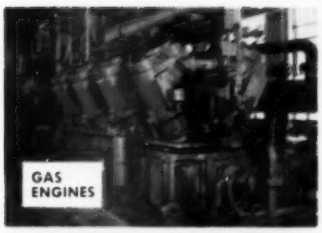
For more facts circle 537 on Reply Card →







SUN SOLNUS OILS IDEAL LUBRICANTS FOR 80% OF ALL APPLICATIONS

Moderately priced...low in carbon-forming tendencies, Sun Solnus® oils simplify your storage problems by doing with *one oil* many jobs that would otherwise require *several.* Their ability to protect metal parts against corrosion, their resistance to oxidation, and their moderate price all add up to "more lubrication per dollar."

For technical information, see your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-51.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

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In Canada: SUN OIL COMPANY LIMITED, Toronto and Montreal

Valve on left is from compressor run for 3,000 hours with well-known, high-grade oil. At right is same valve after a 3,000-hour run with Sun Solnus oil. Note difference in carbon deposits.

3000-HOUR TEST PROVES SUN SOLNUS OILS REDUCE CARBON BUILD-UP IN COMPRESSORS

Equipment: A three-stage Norwalk horizontal-type compressor. Operating pressure: from 1,000 to 1,500 psi.

Test: The compressor was cleaned thoroughly and filled with a well-known, high-grade oil. The equipment was run for 3,000 hours, then torn down for inspection and cleaning. Then Solnus® 300 was tested in the same way.

Results: Look at the two pictures. You can see for yourself how Solnus oil reduced dangerous carbon build-up.

All types of reciprocating air compressors that have been changed over to a Sun Solnus oil show similar results. A test in your compressor will show the same remarkable reduction of carbon deposits.

You can get a technical bulletin about Sun Solnus oils by asking your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-52.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

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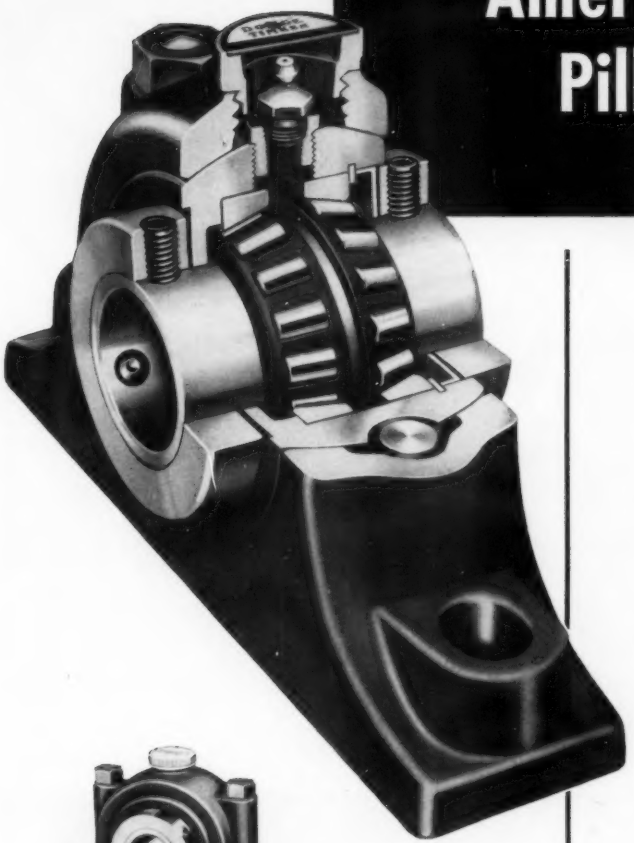
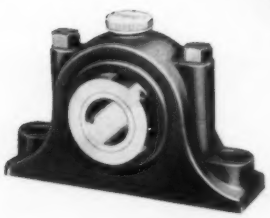
AVAILABLE IN FIVE TYPES FOR ALL KINDS OF SERVICE

DODGE-TIMKEN
America's Quality Pillow Block





- COMPLETELY ASSEMBLED
- FACTORY ADJUSTED
- PRE-LUBRICATED

Call the Transmissioneer, your local Dodge Distributor. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE-TIMKEN Bearings are adjusted, lubricated and sealed at the factory. Labrynth seals effectively retain the lubricant and prevent the entrance of dust and dirt. The inbuilt precision of Dodge-Timken Bearings is protected both on and off the shaft. They are delivered fully assembled, ready to mount.

Where service conditions are toughest Dodge-Timken Bearings prove their quality decisively. For superior performance, dependability and long life they have won their reputation throughout industry as America's quality pillow blocks.

To meet varying service requirements Dodge-Timken Pillow Blocks are available in five types—the type E . . Double Interlock (illustrated) . . Type C . . Special Duty . . . and All-Steel. Available in a range of shaft sizes from 1-3/16" to 10".

Call your Transmissioneer; or write for Bulletin A638 giving load ratings, dimensions and other data on Dodge-Timken Roller Bearings.

DODGE MANUFACTURING CORPORATION
2700 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 538 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

How To Stop Hose "Wicking"

PLACING THE unprotected end of a rubber hose into a liquid—such as into a barrel of gasoline—invites "wicking" that will shorten the effective life of the hose. By capillary action, the liquid will travel up the fibers of the reinforcement of the hose. It will attack and weaken the fibers for a considerable distance from the exposed end.

Wicking may even cause the hose end to swell and eventually to fail. According to recommendations of the Thermoid Company, Trenton, N. J., the simplest way to overcome wicking is to couple a length of metal pipe on the hose end. The pipe should be long enough to prevent contact of the hose end with the liquid, and should be inserted into the hose.

Another easy way to avoid wicking is to use a standard metal end protector which will seal the end against contact with the liquid.

A third preventive is a liquid neoprene rubber compound which dries in a durable film over the end of the hose and prevents the entry of liquids into the fibers of the hose. A similar approach is dipping the end of the hose into shellac to form a film over the end of the hose. This, however, is good only for water applications and should not be used where strong solvents are involved.

Plastic Glazing Goes Mobile

SEVERAL LARGE contractors, building a distribution depot in Kingston, Pa., have eliminated an expensive window breakage problem in their heavy earth moving and construction equipment. They have accomplished this by substituting panes of transparent Plexiglas plastic for conventional safety glass.

Rough service, flying stones, carelessly handled tools and door slamming were taking a heavy toll of glass windows and transparent enclosures in drag lines, shovels, cranes and bulldozers. Breakage was particularly heavy in drag lines. In some cases, windows were replaced as often as once a week; one contractor operating 50 vehicles estimates costs of several hundred dollars in a six month period for replacement.

Plastic Arts Co., Wilkes Barre, Pa., replaced broken glazing with ¼-in.

(Continued on page 56)

Shipyard Foundry Uses Carbon Dioxide for Hardening Cores

HARDENING CORES and molds is a greatly improved operation at the Charleston Naval Shipyard foundry. A new process, used extensively in Europe, has been adopted by the Shipyard, as reported in the Bureau of Ships Journal.

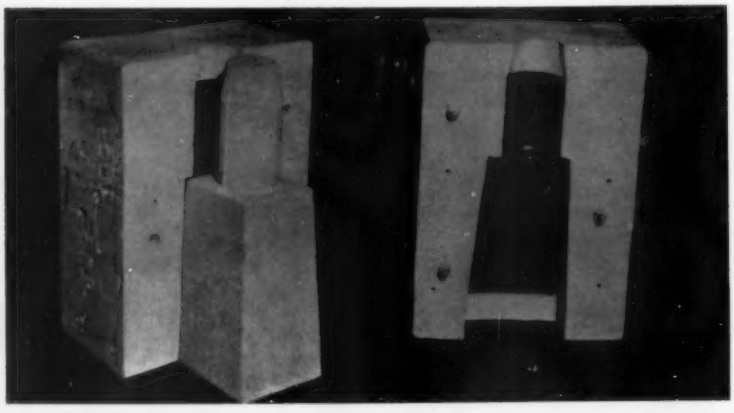
Carbon dioxide gas under 20 lb pressure is bled into box containing core

Cores and molds formerly were oven-baked for long periods at approximately 400 F, to remove all moisture from the sand. In the new process, a carbon dioxide bottle, equipped with proper gages, provides an atmosphere of carbon dioxide.

Cores for the process are made with sodium silicate as a binder, instead of the usual oxidizing oil binder. After the core is formed, and usually while it is still in the core box, it is thoroughly impregnated with carbon dioxide gas. The gas converts the sodium silicate to a solid hydrated combination of sodium carbonate and silicon dioxide that forms a strong core binder. The hardened molds and cores are ready for use when they are withdrawn from the core box.

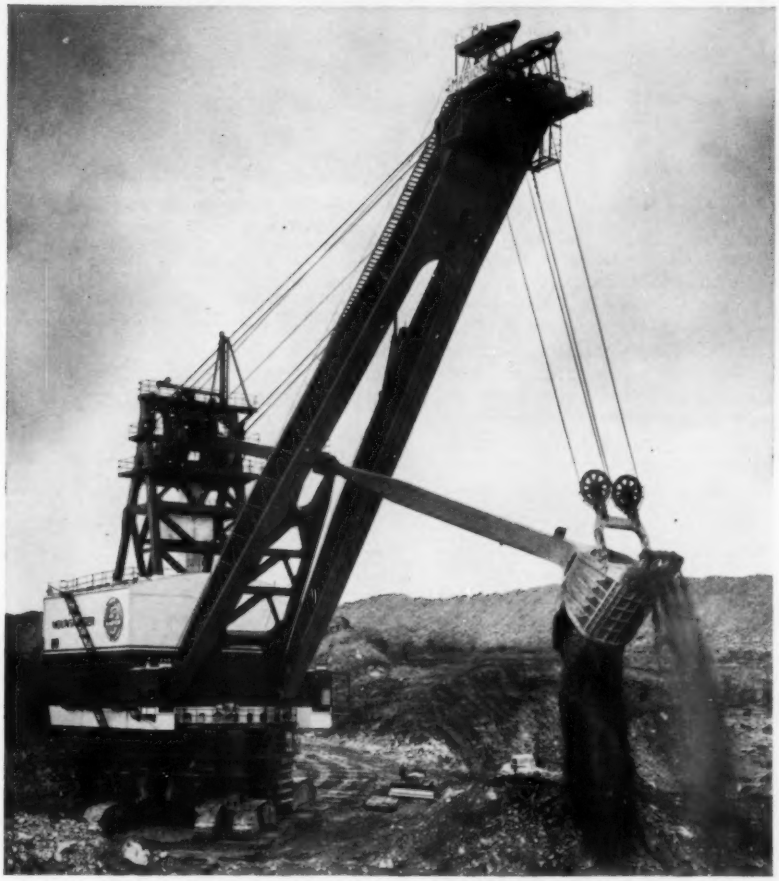
Using the process, intricate shapes can be handled more easily, with a higher degree of dimensional accuracy. Cores and molds no longer have to be taken to and from the oven, and in addition, much of the smoke and gas usually generated during pouring has been eliminated.

Results with aluminum, bronze and iron castings have been extremely encouraging, and further development of the process is underway.



Hardened zircon sand core as withdrawn from core box after carbon dioxide exposure. Core is now ready for use in a casting, with no further treatment

Dry-Type Transformer NEWS

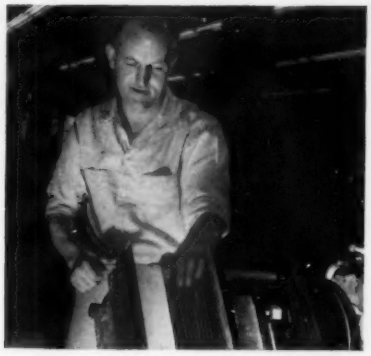


A point of interest: "The Mountaineer" can uncover a seam of coal lying beneath a 90-foot overburden of soil and rock.

General Electric dry-type transformers help maneuver over two thousand tons of mechanical brawn

This is "The Mountaineer," giant power shovel built by the Marion Power Shovel Company for the Hanna Coal Company, Division of Pittsburgh Consolidation Coal Company. To assure fast, dependable maneuverability of the over two-thousand-ton shovel, engineers teamed General Electric control, and voltage-stabilizing transformers. Result: by providing stabilized output to control circuits, the G-E transformers help make it possible for "The Mountaineer" to lift 90 tons, deposit the tonnage 290 feet away, and return for another load in 45 *seconds*.

Alkanex wire trims down size, weight of G-E dry-type transformers



Here's another General Electric "first" in the development of quality dry-type transformers. New, heat-resistant aluminum Alkanex wire is being used to make General Electric dry-type transformers lighter, easier to handle. Weight and size reduction of the transformers results in at least three immediate benefits: reduced shipping costs, easy portability during plant relocation, and space-saving installation in out-of-the-way wall or ceiling areas.

General Electric dry-type transformers and saturable reactors pay for themselves in three months

By substantially increasing the productive capacity of a "booster-melting" glass furnace, the General Electric transformers and saturable reactors paid for themselves in 90 working days. The G-E equipment provides an extra boost of electric heat, decreasing viscosity of the molten glass, and thus making the glass easier to pour, easier to mold. For further information write General Electric Company, Section 410-25, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 539 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

thick panes of transparent Plexiglas, manufactured by Rohm & Haas Co., Philadelphia. Largest panel installed to date in a 32- by 6-in. pane for a crane enclosure.

Since the program started in the fall of 1955, no breakage of the plastic glazing has been reported. Cost of the acrylic plastic in the thickness and grade supplied is about the same as that of double-strength safety glass.

By eliminating the breakage, the plastic glazing has paid off well, considering only the replacement cost, and savings are higher when the former cost of equipment downtime for replacements is added.

Elevators Take Over Meal Handling

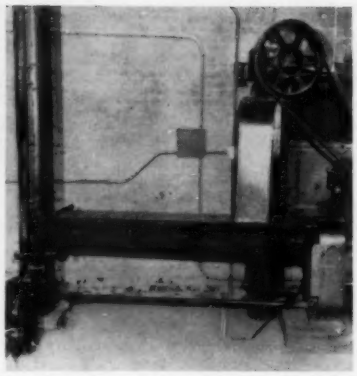
REPLACING a worn-out system for elevating bulk, free-flowing material, Aron Streit, Inc., New York City bakery, achieved unusual benefits, cost-wise. They installed a mechanical system for one-fourth what the installation of another pneumatic system would have cost, and they report 50 per cent saving in operating costs.

The new screw-elevator system was engineered by Fort Worth Steel & Machinery Co., and includes two nine-inch-diameter screw elevators and supplementary screw conveyors.

The lower elevator receives meal on the second floor of the building and lifts it 23 ft to the fourth floor. There a screw conveyor feeds the meal into a second elevator, which lifts it almost 27 ft to a screw conveyor which discharges it into the main storage bin on the sixth floor.

The helicoid screws in the system are coated with a glossy non-toxic finish to prevent corrosion. Interior surfaces of elevator housings and conveyor troughs have the same finish.

Two problems were solved in the new system, that occurred in the old. Dust at the point of discharge into the storage hopper has been reduced, and the clean-out difficulties caused by stoppage in the system—due to motor failure or other breakdown—are much more easily remedied with the quick-opening doors provided in the elevator system.



Transfer point in the screw-elevator system. At fourth floor screw conveyor transfers meal between screw-elevators

Platform Hoist Fits the Aisles

MOVING SIDEWAYS as well as up and down, a platform hoist has been installed at American Air Filter Com-

(Continued on page 58)

Pneumatic Handling of Sawdust, Though on a Small Scale, Is Efficient

AT THEIR new plant in Santa Clara, California, the Norton Company has constructed a packing and shipping station for their grinding wheels that utilizes material handling to advantage.

Packing and shipping station for grinding wheels. Box on chute at left and swivel chute at right feed sawdust to packing boxes as needed. Flexible hose at left is part of pneumatic system that carries sawdust from floor bin to hopper

Sawdust, which is used to pack the wheels to prevent breakage in transit, is stored in a hopper feeding twin chutes over the packing station. One chute outlet terminates in a swivelled spout, which is easily moved over a box being packed, to fill it with the required sawdust, and is easily returned to position over a flat plate which acts as a slide valve to shut off the flow of the sawdust.

The second outlet is fitted with a square box, which in turn is fitted with a sliding plate door that can be opened by the operator as he needs sawdust for packing.

An unusual feature of the system is the use of a flexible hose to convey sawdust from a floor bin up to the entry of the hopper. When sawdust is delivered to the area, it comes in 80-lb. bags, primarily because of the limited quantities of sawdust used. The bags of sawdust are dumped into a floor bin near the packing area, the flexible hose is placed in the bin and a blower, mounted near the top of the hopper carries the sawdust pneumatically from the floor bin to the storage hopper overhead.

When not in use conveying sawdust, the end of the flexible hose is hung on an adjacent column, out of the way of the production operators.

PRESENTING...

the NEW LINK-BELT MOTOGEAR

for bracket-mounting NEMA motors

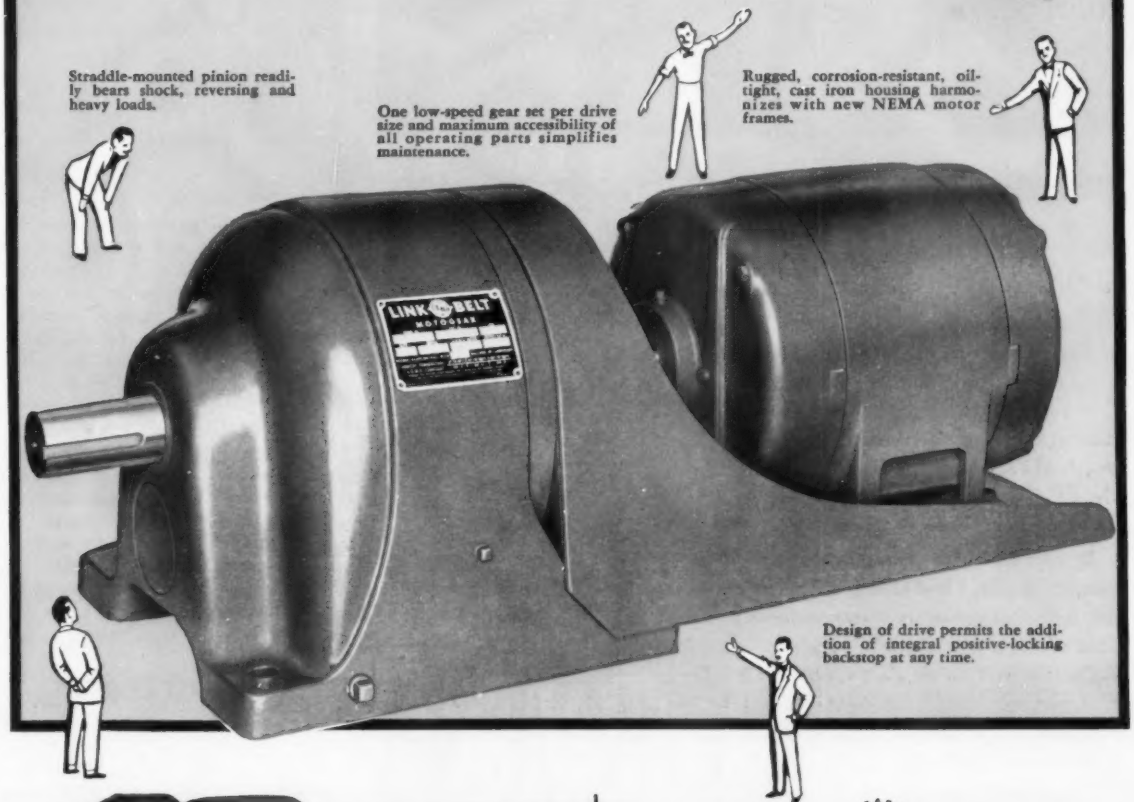
If drives in your plant operate continuously, the dependability of Link-Belt Motogears provides a sure means of minimizing costly, production-crippling downtime. Replacing a motor is simple and easy: just remove four bolts and separate the coupling—no need to drain oil. And design of the bracket assures rapid motor realignment. Sizes up to 60 hp; ratios from 6.2:1 to 292:1.

These are just a few of many advances in design you'll find detailed in 28-page Book 2447. Get a copy now from your nearest Link-Belt office or authorized distributor of Link-Belt products.

Straddle-mounted pinion readily bears shock, reversing and heavy loads.

One low-speed gear set per drive size and maximum accessibility of all operating parts simplifies maintenance.

Rugged, corrosion-resistant, oil-tight, cast iron housing harmonizes with new NEMA motor frames.



Design of drive permits the addition of integral positive-locking backstop at any time.

The new, improved Link-Belt line also includes compact Gearmotors with flange-mounted NEMA motors combining flexibility with outstanding design innovations.

LINK-BELT

ENCLOSED DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 12,800

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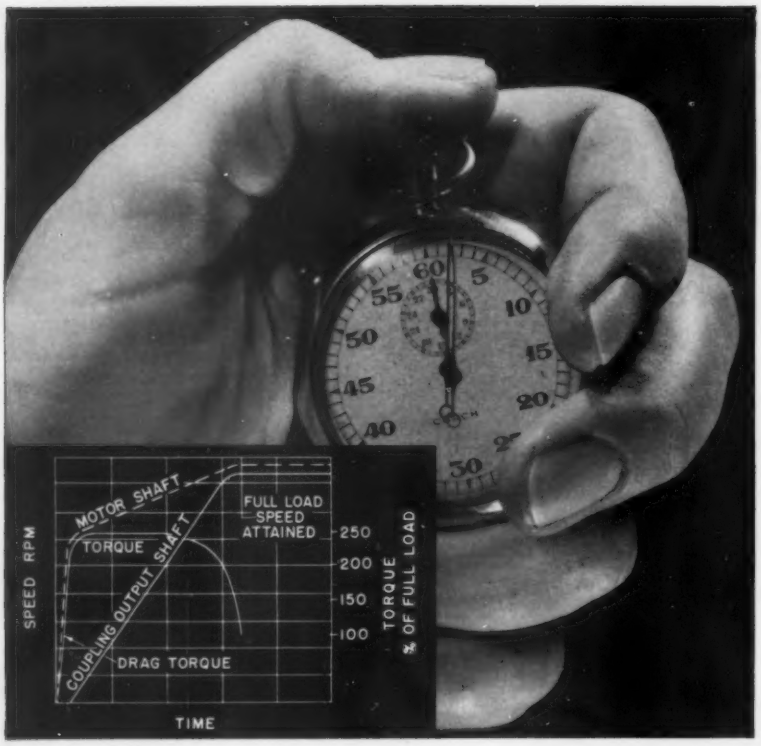


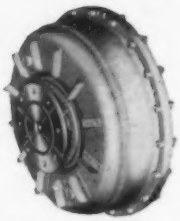
How to get your motors out of the high heat curve... *fast*

Thousands of equipment owners have already proved it: the fastest way to get a normal induction type motor "out from under the load" and up to normal rpm—and keep it there without shocks and vibrations—is through the fluid "slip" within a Twin Disc Double-Circuit Fluid Coupling.

By *eliminating* mechanical connection, Twin Disc Fluid Couplings permit *full acceleration of motor under load within a few seconds* . . . while the output shaft of the fluid coupling transmits *full* input torque of the motor, and brings the load up to speed *smoothly* and *gradually.*

In addition, Twin Disc Fluid Couplings offer such advanced performance features as *Double-Circuit design* . . . making them the *most efficient fluid drives available today.*

Write Twin Disc—Dept. DS, Racine, Wisc.—for *complete* information! Ask for Bulletin 144-D.



Twin Disc Fluid Couplings are available in 9 different types (Model 12.2 HCB Coupling shown), with the broadest variety of input, output combinations, and in sizes from 7.4S to 27 to accommodate motor- or engine-installations from fractional to 850 hp.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division, Rockford, Illinois

For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

pany's plant at Morrison, Ill. This plant is one of the units of the company's Herman Nelson Division.

Storage space needed in a limited area for many different sizes of elec-

Operator rides on hoist platform to move motors in and out of storage

tric motors, ranging up to five horsepower, created a problem—further complicated by the fact that the motor inventory had to be kept in an enclosed area, measuring only 20 by 60 feet.

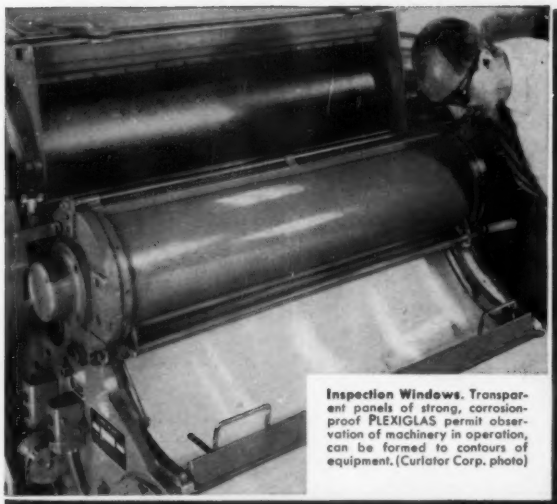
Floor-to-ceiling shelving, 5 shelves high, proved to be the solution. Aisles limited by floor space availability provided a handling problem, both in storing and removing the motors.

The platform hoist, really a four-way self-powered ladder, designed and constructed by Morrison personnel for easy maneuverability in the aisles, has proved a versatile warehousing tool.

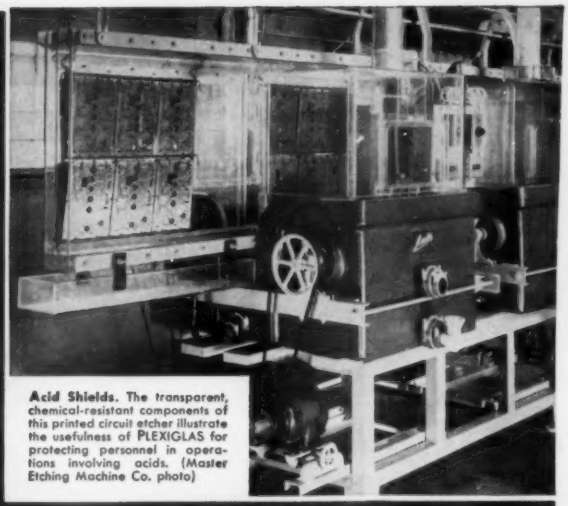
Valves Lick Tough Chemicals

USING LUBRICATED plug valves, the Allied Asphalt & Mineral Corp., Dunellen, N. J., has all but eliminated maintenance of valves operating under extremely rough conditions.

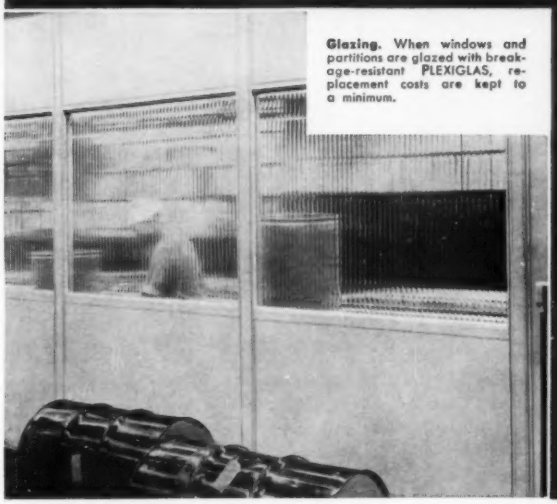
Allied compounds special chemicals such as plasticizers, oil extenders, saturants and waxes, made from materials including pitches, crude and refined tall oil, petroleum oils and asphalts. Valving problems included the need to replace packing and seat rings every few weeks, jamming due to for-



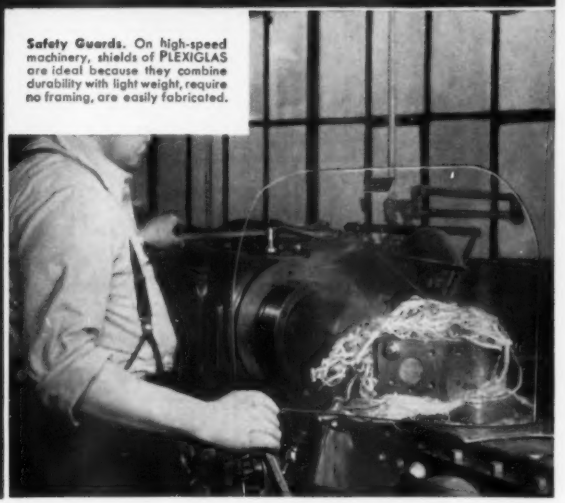
Inspection Windows. Transparent panels of strong, corrosion-proof PLEXIGLAS permit observation of machinery in operation, can be formed to contours of equipment. (Curlator Corp. photo)



Acid Shields. The transparent, chemical-resistant components of this printed circuit etcher illustrate the usefulness of PLEXIGLAS for protecting personnel in operations involving acids. (Master Etching Machine Co. photo)



Glazing. When windows and partitions are glazed with breakage-resistant PLEXIGLAS, replacement costs are kept to a minimum.



Safety Guards. On high-speed machinery, shields of PLEXIGLAS are ideal because they combine durability with light weight, require no framing, are easily fabricated.

Plexiglas—useful in so many ways around the plant

PLEXIGLAS® is a remarkably versatile material. It is used for aircraft enclosures, tail lights on cars, faces and letters of signs, diffusers on lighting fixtures, and dome skylights—to mention just a few of its widely varied fields of application. And in industrial plants, the uses of this acrylic plastic are equally diverse.

Check the typical plant applications shown above, and the properties listed below. The chances are that you will discover one or more ways to use PLEXIGLAS to advantage in *your* plant.

- great strength, light weight and crystal-clear transparency
- resistance to corrosive atmospheres
- excellent electrical properties
- all-weather durability
- formability to almost any shape
- machining characteristics like those of wood or soft metals

PLEXIGLAS R, the lower-cost grade, is especially suitable for industrial plant applications. Call your nearest dealer for information and quick delivery.

Dealers are listed under PLEXIGLAS in the Plastics section of classified telephone directories of most large cities.

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Canadian Distributor: *Crystal Glass & Plastics Ltd., 130 Queen's Quay at Jarvis Street, Toronto, Canada*

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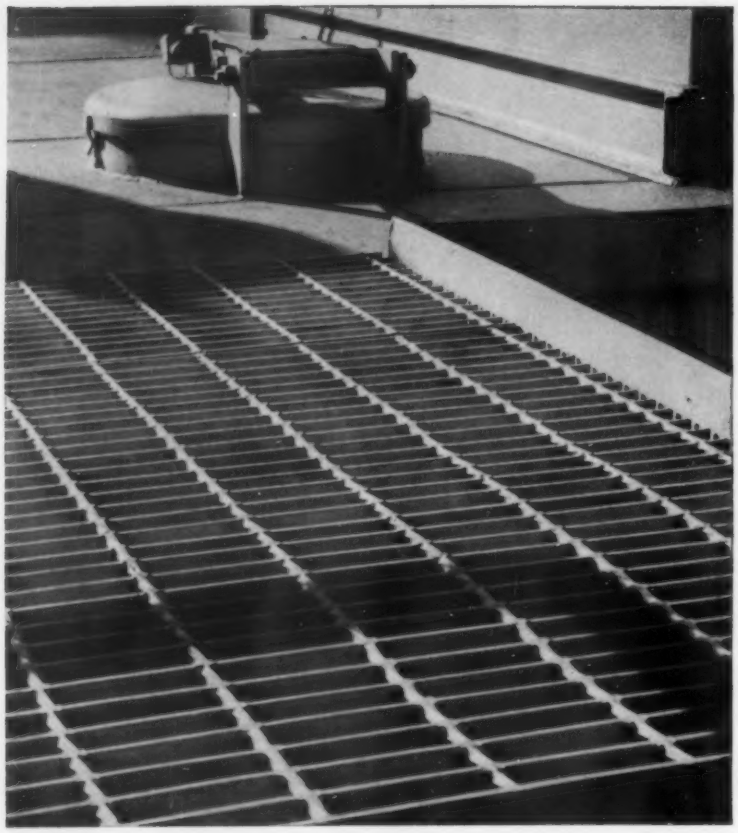


... make every step a safe step

BLAW-KNOX ELECTROFORGED® STEEL GRATING and STAIR TREADS

Indoors or outdoors, you can provide safe walking conditions throughout your plant on floors, stair treads, platforms, walkways and catwalks. For Blaw-Knox Electroforged Steel Grating brings you these exclusive features:

1. rigid one-piece construction—easy to install
2. non-slip twisted crossbar—for safe footing
3. three types of bearing bars
   - square bars—for smoothest walking surface
   - knurled bars (Furro-Grip)—for extra safety plus relatively smooth walking surface
   - serrated bars—for maximum safety under extremely hazardous skid conditions
4. no sharp corners to clog—self-cleaning
5. all surfaces accessible—easy to paint
6. maximum open area—for light and ventilation

Write for your copy of new Bulletin No. 2486
—or send dimensional sketch for quotation.

50th Anniversary BLAW-KNOX 1906-1956

BLAW-KNOX COMPANY
Equipment Division
1102 Blaw-Knox Building • 300 Sixth Avenue
Pittsburgh 22, Pennsylvania

GRATING APPLICATIONS: floors • platforms • walkways • catwalks • stair treads • fan guards • shelving • and many other uses, both outdoors and indoors, for versatile steel grating

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

Lubricated plug valve assures fast valve action in 30-second drum filling

eign material, and damage by rapid heating and cooling from torches used to melt material solidified in lines.

Rockwell-Nordstrom valves have minimized replacement of packings and seat rings, and since the plug shears off line debris on opening or closing, jamming is infrequent.

If You Insist on Blowing Chips, Plastic Guard Will Lessen Risk

Contributed by R. E. Franklin

FOR SEVERAL REASONS, the use of compressed air is to be avoided as much as possible, for cleaning machine tools and components. Swarf and dirt tend to be blown in the machine slides, with the consequent deterioration of the machine's accuracy, and metal particles blowing in all directions, including that of the operator, are a definite hazard to nearby personnel.

These objections to the use of blow-guns are well known, but are often ignored because of the convenience and efficiency of compressed air as a dust disperser. The danger to the operator can be minimized to a certain extent, however, by fitting a simple transparent guard to the front of the air-gun nozzle. The guard suggested is a disc of transparent plastic, approximately 3/16 in. thick and 4 in. in diameter. Taper bored, the hole in the center of the disc will fit snugly over the taper on the nozzle, to lock in place.

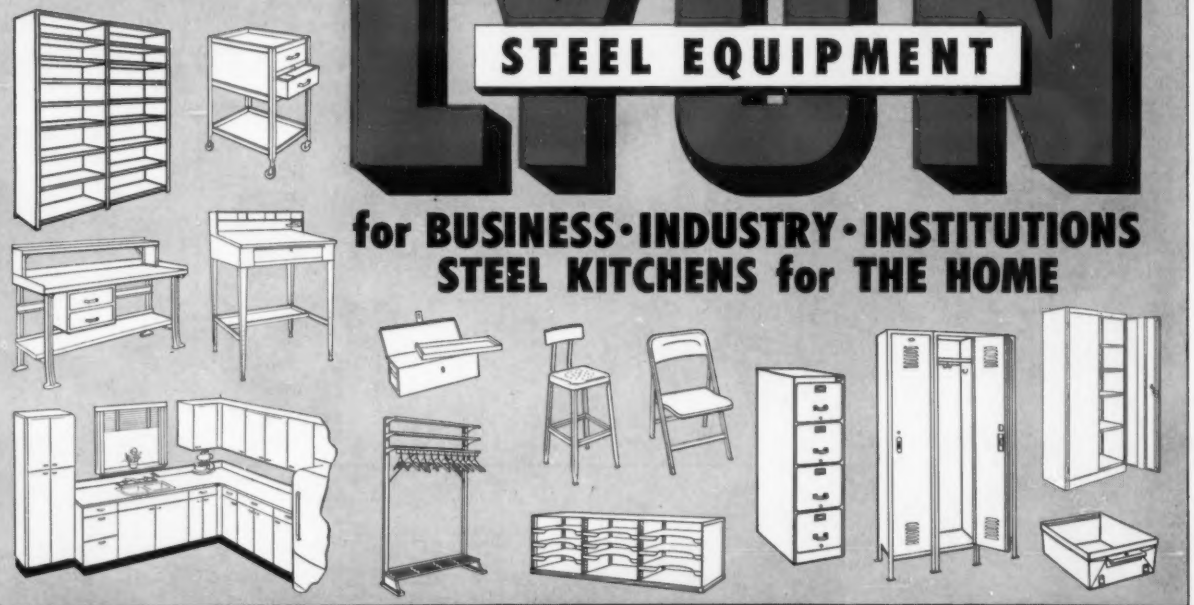
With the shield installed, dirt and swarf from the machine being cleaned are prevented from flying in the operator's direction; any particles blown back toward him will bounce off the guard.

The transparency of the guard insures the operator's view of the area

Ask your LYON Dealer for

LYON®

STEEL EQUIPMENT



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STEEL KITCHENS for THE HOME

A PARTIAL LIST OF LYON STANDARD PRODUCTS

- Shelving
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- Kitchen Cabinets
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- Drawing Tables
- Tool Toters
- Bar Racks
- Tool Boxes
- Parts Cases
- Chests and Safes
- Display Equipment
- Toolroom Equipment
- Wood Working Benches
- Flat Drawer Files
- Revolving Bins
- Filing Cabinets
- Hanging Cabinets
- Folding Chairs
- Coat Racks
- Work Benches
- Bench Drawers
- Service Carts
- Sorting Files
- Drawer Units
- Hopper Bins
- Tool Stands
- Shop Boxes
- Tool Trays
- Shop Desks

Lyon also has complete facilities for manufacturing special items to your specifications

LYON METAL PRODUCTS, INC.
General Offices: 1191 Monroe Ave., Aurora, Ill.
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BIDDLE *Instrument News*

BIDDLE MOTOR ROTATION TESTER ELIMINATES GUESSWORK AND DANGER

SAVES TIME in Electric Motor Hook-Ups

This tester eliminates the need for temporary connections which can be time consuming, costly, and quite hazardous, particularly where many large high-voltage motors are involved. With this instrument you can very easily determine direction of rotation for any size 1, 2 or 3-phase motor, and make your first connections *permanent* ones with safe assurance they are correct. You can use it also to test circuits, check phase sequence and identify windings of multi-speed or multi-voltage motors.

Write for BULLETIN 80-PL

MEGGER® ELECTRICAL INSULATION TESTERS

Hand—Rectifier—or Combination Operation—

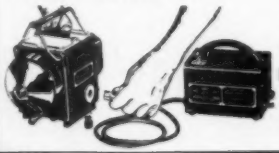
Ratings up to 2000 Megohms and 1000 Volts D-C

HAND CRANK MEG TYPE

of Megger Insulation Tester is a reliable field instrument, light, sturdy, with a constant-voltage type generator—no dependence on batteries or other current supply. By far the most popular instrument among electrical plant maintenance men. Easy to use—easy to read—and rugged in constant services.

RECTIFIER OPERATED Meg Type of Megger Insulation Tester simply plugs into a convenient outlet. Portable or flush bench-mounted. A dependable production or inspection instrument. Quick, easy readings speed up otherwise costly tests.

DUAL-OPERATED MEG TYPE of Megger Insulation Tester may be operated by hand or rectifier. Excellent solution for those requiring a versatile instrument for field and bench use.



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Average Measuring RPM or FPM Jagabi® Speed Indicator

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Instantaneous Speeds or Variations in Speeds. Write for BULLETIN 35-PL

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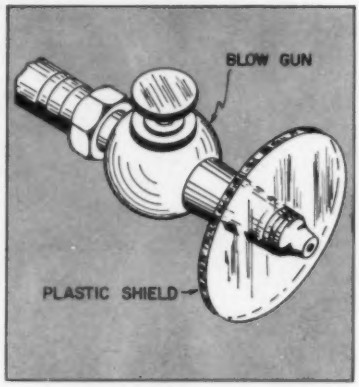
OPERATION — PRODUCTION

(O and P begins on page 54)



Plastic disc deflects dirt away from operator, when loosened by air blast

being cleaned, since the end of the nozzle is always visible. The disc should be as large in diameter as possible, consistent with convenience—the larger it is, the greater its shielding effect.

Power Tools Speed Fastening

METALWORKING SHOPS and industrial plants that find final assembly a production bottleneck can profit by the experience of Orr & Sembower, Inc.,

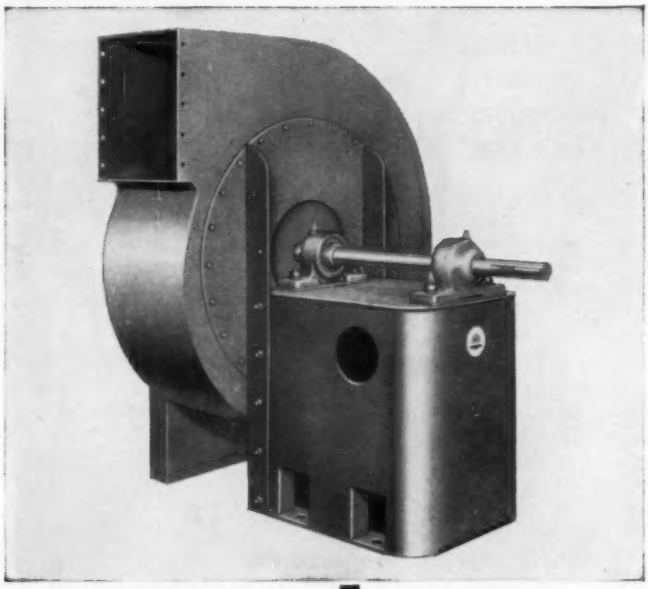
Operator uses electric impact tool to run down nuts on boiler cover studs

manufacturer of packaged automatic boilers. This firm uses electric power tools to assemble boiler cover plates and jackets. Fastenings are run down in only 5 per cent of the time normally required with a conventional hand wrench or brace and bit screw driver.

An Ingersoll-Rand electric Impac-

NEW FEATURES! HIGHER EFFICIENCIES! NEW "3-IN-1" DESIGN!

AMERICAN BLOWER SERIES 106 INDUSTRIAL FAN



Series 106 Industrial Fan

Certified ratings! Pressures to 18" w.g.! Volumes to 125,000 cfm! Heavy construction! Choice of 3 special-duty wheels! You get all these features, and many more in American Blower's new Series 106 Industrial Fans.

Available in 16 sizes, each with a high efficiency rating. Series 106 fans offer a wide range of optional accessories and construction features to meet standard or special specifications – *or* you can buy it in 7 sizes as an efficient, heavy-duty "packaged" industrial fan, complete with motor, V-belt drive and weathertight running-gear enclosure.

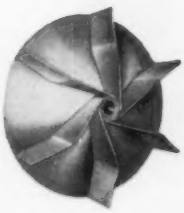
Get complete data from your nearest American Blower Branch Office, or write for Bulletin 5306-H.

CERTIFIED RATINGS
AUTHORIZED BY N A F M
Certified Ratings
CFM

Choose the wheel to fit the duty

Air Handling – for efficient handling of air, fumes, or gases – either clean, or containing light concentrations of dust or materials.

Material Handling – efficiently handles air or gases containing granular material – dust grain, exhaust from buffing or grinding wheels.



Long Shavings – specially designed for conveying or handling air or gases containing long stringy material – wood shavings, fibers, alfalfa.

American Blower products serve industry

- Air Conditioning, Heating, Ventilating Equipment
- Mechanical Draft Equipment
- Industrial Fans and Blowers
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AMERICAN **BLOWER**

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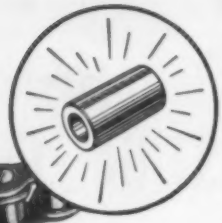


THIS EXCLUSIVE BUSHING PRESENTS NEW DESIGN OPPORTUNITIES!

WHITNEY SELF-LUBRICATING ROLLER CHAIN FOR IMPORTANT SAVINGS —LONGER CHAIN LIFE

A new and exclusive Roller Chain with *built-in* lubrication . . . a product of Whitney Chain research. High strength, oil-impregnated sintered steel bushings oil from the *inside* . . . make chain drives practical and profitable where lubrication cannot be applied, or where normal lubrication may contaminate products in process.

Typical applications include textile, tobacco and food processing machinery, or wherever products must be isolated from lubricants. Here, Whitney Self-Lubricating Chain cuts production costs, gives chain service life far beyond that of non-lubricated chain and is completely interchangeable with American Standard Roller Chain of the same pitch.

Get the facts on this revolutionary development in the Whitney Self-Lubricating Chain Folder covering case histories, wear and impact tests, strengths and sizes available.

WHITNEY ENGINEERING SERVICE

Consult your nearby Whitney Field Office on any of your drive problems. Whitney's complete line of Roller, Silent, Conveyor Chains and Sprockets enables our technicians to help you determine the chain best suited to your requirements.

Whitney

CHAIN COMPANY

232 HAMILTON STREET, HARTFORD 2, CONNECTICUT

ROLLER CHAIN • SILENT CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS

For more facts circle 547 on Reply Card

OPERATION — PRODUCTION

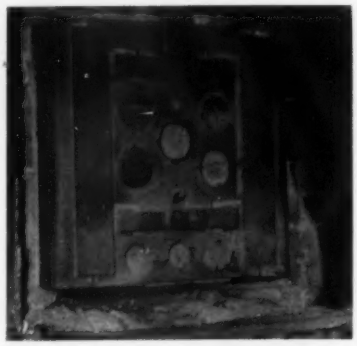
(O and P begins on page 54)

tool is used to run ⅜-in. and ½-in. hex nuts on studs which hold the front and back covers. Savings in time are effected on the original assembly operation and again in the re-assembly of the units after test.

A smaller size of electric tool is used with screw driver attachment to fasten boiler wrapper sheets that protect the insulation, running down ¾-in. long sheet metal screws. The tool is also used on No. 10 metal screws on the shell stamping plates and on ½-in. No. 14 metal screws on pipe collars in the shell.

"Fire Protection" For Furnace Doors

FORGE FURNACE doors are lined with firebrick to prevent rapid distortion from the intense heat inside the furnace. A flange across the bottom of the door is usually employed to support the bricks, and hold them in place. However, it was necessarily exposed to the flames inside the furnace, and deteriorated after about six months' service.



Furnace door, after six months' service. Draw bolts tighten clamp on bricks

Replacement of the flange required removal of the firebrick and renewal of the door.

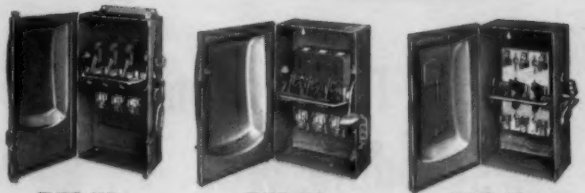
A door frame designed at the Charleston Naval Shipyard and reported in the Bureau of Ships Journal is completely protected from the heat of the furnace. None of the metal frame comes in contact with the flames, there is little or no deterioration, and the frame will last indefinitely.

In the new door, the brick is laid in place in the frame, and draw bolts located outside the door are tightened to hold the brick firmly in place.

FIRST with a COMPLETE LINE OF SAFETY SWITCHES to meet the NEW NEMA STANDARDS

• The table below shows Square D switches meeting new industry specifications. Notice how they clarify conflicting features which existed under old designations. Notice, too, that they establish a new, heavy-duty industrial switch, Type HD.

One important thing which remains unchanged is the **DESIGN LEADERSHIP** which has made **SQUARE D SAFETY SWITCHES** industry's overwhelming **FIRST** choice for more than fifty years. Compare them, feature for feature. They cost no more, why settle for less?



TYPE HD TYPE ND TYPE LD

DESCRIPTION	HEAVY DUTY New	NORMAL DUTY formerly Types H, S, or A	LIGHT DUTY formerly Types D or G
Rating-Ampere Voltage	30—600 250 or 600V AC, DC	30—1200 250 or 600V AC, DC	30—200 250V AC
Enclosure	NEMA 12 • Industrial Use (Gasketed) NEMA 4 & 5 • Water-tight & Dust-tight NEMA 7 • Explosion-resisting Class I—Group D NEMA 9 • Explosion-resisting	NEMA 1 • General Purpose NEMA 3R • Raintight	NEMA 1 • General Purpose NEMA 3R • Raintight
Horsepower Rating	NEC Fuse Ratings Dual-Element Fuse Ratings	NEC Fuse Rating Dual-Element Fuse Ratings	NEC Fuse Rating
Operating Mechanism	Quick-Make, Quick-Break Independent of Handle	Quick-Make, Quick-Break Independent of Handle	Positive Make, Positive Break Spring Assisted
Cover	Interlocked & Padlock Attachment	Interlocked & Padlock Attachment	Padlock Attachment
Plating—Current Parts	Extra-Heavy Silver	Silver	
Endurance	Maximum Endurance Far Exceeds UL Standards	Exceeds UL Standards	Meets UL Standards

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

For more facts circle 548 on Reply Card

JAMES E. DAVIS CHIEF ELECTRICIAN
NORTHWESTERN GLASS CO.

"Our Production schedule was frequently disrupted by needless shutdowns on a line of motors . . *until we changed to Fusetron Fuses*"

James E. Davis,
CHIEF ELECTRICIAN, NORTHWESTERN GLASS COMPANY
SEATTLE, WASHINGTON

"Ordinary 500 amp. renewable fuses were blowing frequently in a 1000 amp. switch that controls a line of motors ranging in sizes up to 150 hp.

"We work on a tight production schedule, so these shutdowns with men and motors standing idle were costing us a considerable amount of money and trouble.

"As chief electrician, the problem was 'thrown in my lap'.

"A study of the situation indicated that harmless surges were causing the fuses to blow.

"We figured that the long time-lag of Fusetron dual-element fuses might correct the trouble.

"They were installed in 1953 and the original Fusetron fuses are still in service.

"We think this is quite a record because the switch is loaded to capacity 24 hours a day 7 days a week, only Christmas and July 4th excepted."

Here's why Fusetron Fuses give all purpose Protection

A fuse link combined with a thermal cutout - the result, a fuse with tremendous time-lag and much less electrical resistance and an interrupting rating in excess of 100,000 amps.

They have the same degree of Underwriters' Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to same dimensions as ordinary fuses. FUSETRON Fuses fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 amperes, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

Their cost is surprisingly low.

Write for bulletin FIS.

THOMAS F. CURRAN
MACHINE OPERATOR

FOR LOADS ABOVE 600 AND UP TO 5,000 AMPS., USE BUSS Hi-CAP FUSES . . .

They have unlimited interrupting capacity to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuit of origin.

Write for bulletin HCS.

FUSETRON DUAL-ELEMENT FUSES DO MORE THAN ELIMINATE DOWN PERIODS CAUSED BY NEEDLESS BLOWS . . .

They Provide 10 Point Protection . . . .

1. High interrupting capacity — protect against heaviest short-circuits. Have proven on tests to open safely on circuits set to deliver in excess of 100,000 amperes.
2. Protect against needless blows caused by excessive heating — lesser resistance results in cooler operation.
3. Protect against needless blows caused by harmless overloads.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect against waste of space and money permit use of proper size switches and panels.
6. Protect motors against burnout from overloads.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Protect motors against burnout due to single phasing.
9. Make protection of small motors simple and inexpensive.
10. Protect coils, transformers and solenoids against burnout.

Play Safe!* install FUSETRON *dual-element Fuses and BUSS Hi-Cap Fuses throughout entire Electrical System!

BUSSMANN MFG. COMPANY
(Division of McGraw Electric Co.)
UNIVERSITY AT JEFFERSON ST. LOUIS 7, MO.

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

1156

For more facts circle 549 on Reply Card

Now—for maximum Roof Protection Johns-Manville

Aquadam

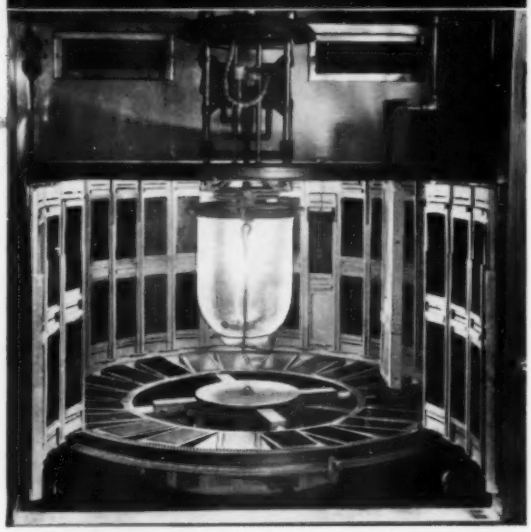
(slag or smooth surfaced)

Built-Up Roofs*

Aquadam offers these important advantages:

- Superior weather resistance
- Superior resistance to cracking
- Improved self-healing properties
- Greater kettle stability
- Greater adhesion—stronger bond
- Greater resistance to water
- Excellent uniformity

Tests prove Aquadam's superior weather resistance!



J-M's Accelerated Weathering Test subjected samples of dead level bitumens to repeated radiation, water spray and refrigeration. Results: Aquadam has approximately twice the ability of typical asphalts to retain its initial properties on exposure.

J-M Aquadam proved superior by actual test... helps provide longer roof life at no extra cost

Johns-Manville Aquadam is specifically designed to provide maximum built-up roof service for deck inclines from dead level to ½″ per foot*.

J-M Aquadam Built-Up Roofs owe their proven superiority to the newly developed bituminous asphalt cementing agent Aquadam—which is used in the application of the roofing felts.

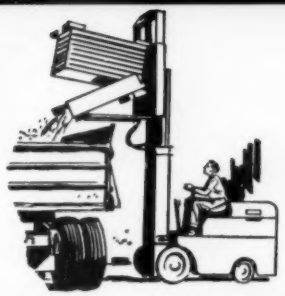
When applied, the excellent adhesive properties of Aquadam provide a permanent bond to the felts, and to gravel or slag surfacing. Its rigidly controlled quality and excellent flow properties assure easier mopping, thorough coverage, and longer lasting roof life.

For complete information about Aquadam Roofs, see your Approved Johns-Manville Built-Up Roofing Contractor. He's listed in the classified section of the telephone directory. Or write Johns-Manville, Box 158, New York 16, N. Y. In Canada, write 565 Lakeshore Rd. East, Port Credit, Ont.

JOHNS-MANVILLE JM PRODUCTS **Johns-Manville**

For more facts circle 550 on Reply Card

How materials handling is made easier by B.F.Goodrich Industrial Tires



Fast, quiet and cushioned! These new electric sit-down trucks run quickly and quietly through the aisles of this big Food Fair warehouse. Smooth Tread DeLuxe Cushion Pressed-On tires help cushion fragile food loads, prevent damage.

Dual drive wheels and differential action permit easy steering of this pedestrian-operated power lift truck. B. F. Goodrich Vulcanized-on tires with smooth tread are "just right" here. They will take heavy loads and withstand the wear and tear of short, sharp turning.

Car-mover and yard-hauler, too! This vehicle handles two jobs. It pulls railroad freight cars. Or it drops its "ground" wheels with B. F. Goodrich All-Purpose pneumatic tires, drives off the tracks and pulls trailers through factory yards. All-Purpose pneumatic tires provide the traction and strength required for versatile use.

Up and down the ramp 125 times a day with sugar! Here's a job that B. F. Goodrich Pressed-On Lug tires help make easy. Pressed-On tires provide firm cushioning to protect loads, lessen driver fatigue by reducing vibration. The Lug tread supplies the traction necessary to negotiate ramps in all kinds of weather.

more

For more facts circle 552 on Reply Card

B.F.Goodrich

TW TIRE AND WHEEL Analysis cuts tire costs

Varying loads and conditions at the Port of Portland warehouse calls for versatile tires. You just can't beat these B. F. Goodrich All-Purpose pneumatic tires for all around use in all kinds of weather, inside or outside.

Paper for paper cups. Here a heavy coil of paper is moved gently to production lines at the Solo Cup factory in Chicago. Roll clamps and the cushioned ride provided by B. F. Goodrich DeLuxe Cushion Pressed-On tires protect both the load and floors from damage.

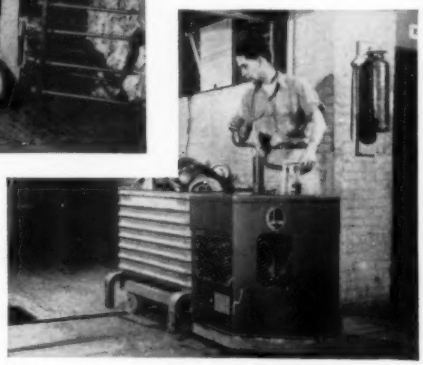
Potatoes for potato chips! About 160,000 pounds of raw potatoes are handled every day by this truck at the H. W. Lay and Company plant in Atlanta. Smooth Tread Pressed-On tires absorb shock, provide load protection, reduce floor wear and lessen driver fatigue on this big job.

Ask for a FREE TW Analysis

If you know which industrial tires—which types, sizes, tread designs and compounds—are right for your materials handling jobs, then you can cut your tire costs. The B. F. Goodrich Tire and Wheel Analysis man can give you the answers. His recommendations could save you as much as 50% on tire costs, up to 20% on maintenance expense. Just mail the coupon for this free service. A consulting service is available to manufacturers of materials handling equipment.

B.F.Goodrich
FIRST IN RUBBER

Specialized equipment saves money! Pronged attachments for handling wool saved $8,320 per truck annually in this textile mill. Long-wearing B. F. Goodrich Pressed-On tires with smooth treads are saving money here, too, because they are engineered to match the job.



Sometimes a combination is best! On this truck the main drive wheel (under housing) is a B. F. Goodrich Pressed-On tire with a traction tread. The two tires on the load wheels are Vulcanized-on tires for extra load capacity.

B. F. Goodrich Tire Company
A Division of The B. F. Goodrich Company
Department TW-607, Akron 18, Ohio

I would like further information on your FREE TW Analysis.

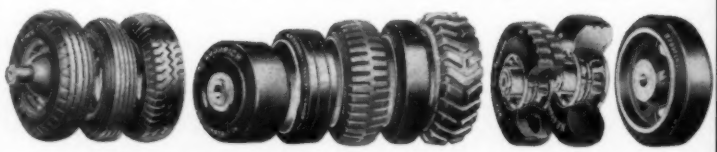
NAME_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE____

***Specify B. F. Goodrich* tires when ordering new equipment**



For more facts circle 552 on Reply Card

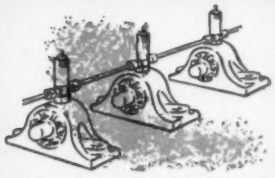
How to cut costs with

ALEMITE Accumatic®

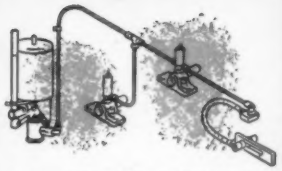
CENTRALIZED AUTOMATIC LUBRICATION

Can be built into any machine, in 4 easy steps

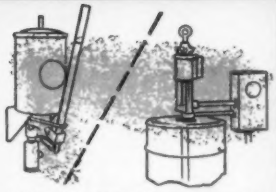
1. Replace grease cups or grease fittings with Accumatic fittings. (Available in same thread sizes as grease fittings, cups.)



2. Connect Accumatic fittings with copper tubing. (Alemite has tubing, clips and accessories for fast, neat installation.)



3. Connect sliding, rotary or oscillating parts into tubing system. (Flexible hose and swivels available for moving parts.)



4. Provide central pump to supply lubricant to system. (May be ordinary hand pump or fully automatic barrel pump.)

Type 1 Accumatic Valves

For fluid oil or light grease. In range of sizes, delivering from .005 to .100 cu. in. of lubricant. Various shapes: Tees, straight-thru, inserts, angles. Spring pressure provides gradual feed. Adjustable or fixed output. System serves up to 400 bearings. Manual or automatic operation available.

Factory-tested—field-proved!

Exhaustive in-the-field tests show no appreciable variation in the amount of lubricant discharged after 73,312 lubrication cycles—equal to 122 *years* of *twice-a-day service!*

Offers All These Advantages!

- Prevents application of wrong lubricant.
- Seals completely against dirt, grit, water.
- No parts are neglected—lubricates inaccessible and dangerous bearings.
- Eliminates product spoilage due to over-lubrication.
- Eliminates point-by-point lubrication methods—services all bearings in one operation.
- Delivers *exact* amount of lubricant to bearing.

ALEMITE

REG. U. S. PAT. OFF.

A Product of STEWART-WARNER CORPORATION

STEWART SW WARNER

FREE!

Alemite, Dept. G-116
1850 Diversey Parkway, Chicago 14, Illinois

Please send me my free copy of the Alemite Accumatic Catalog.

Name.....

Company.....

City..... State.....

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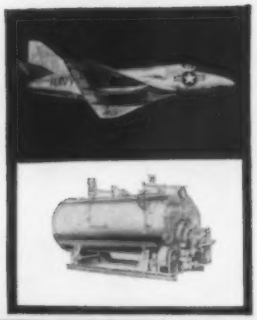
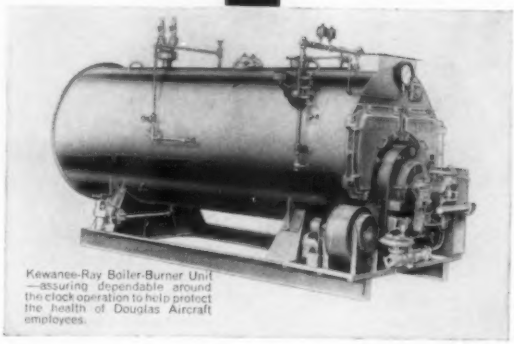


Sisters under the skin . . . when it comes to "cruising speed"

Archt. & Engr.—Main Lobby Bldg.: Van Dyke & Barnes, Los Angeles, Calif.
Archt. & Engr.—A4D Production Facilities: Holmes & Narver, Inc., Los Angeles, Calif.
Heating Contractor: E. W. Hardson, Inc., Los Angeles, Calif.

KEWANEE
reserve plus rated

■ No one knows the importance of "cruising speed" operation in aircraft better than the Douglas Aircraft people. They know an airplane, to be efficient, to operate economically, to have longer life, must fly at "cruising speed." They know, too, there must be extra reserve power for take-off—for emergencies. So, when it came to boiler selection for the new A4D Skyhawk production facilities at their El Segundo, California Division, it was only natural they turned to Kewanee Reserve Plus Rated Boilers with 50% extra built-in power assuring "cruising speed" operation. For "cruising speed" means less strain—less wear. It means higher efficiency . . . it means lower maintenance and repair costs. Kewanee Boilers are rated on nominal capacity with reserve to take care of normal needs—meet emergencies of the present—fluctuating loads and future expansion. A boiler rated on maximum capacity, operating at constant top speed, requires more maintenance, constant attendance. Choose Kewanee—for lower fuel and maintenance costs.



Kewanee-Ray Boiler-Burner Unit —assuring dependable around the clock operation to help protect the health of Douglas Aircraft employees.

AMERICAN-Standard

KEWANEE BOILER DIVISION

KEWANEE BOILER DIVISION of AMERICAN-STANDARD, 101 Franklin Street, Kewanee, Illinois

For more facts circle 554 on Reply Card

This installation consisting of seven hand-propelled cranes on a flexibly suspended runway is used for stripping wire blocks in a large steel mill.

Note how easy it is with the Cleveland Tramrail design to position the runway at any level or location desired. Likewise, it is extremely simple to dismantle and relocate the equipment to serve some other application, should such ever be necessary.

FLEXIBLE SUSPENSION

Assures Smooth Crane Operation

CLEVELAND Tramrail's unique flexible suspension method of supporting crane runways prevents binding of wheels on the tracks and assures smooth easy rolling operation, regardless of location of the load on a crane bridge.

The floating runways compensate automatically for normal skewing or twisting of crane bridges.

This is one of the reasons why hand-propelled Cleveland Tramrail cranes can be used for so many jobs where motor-driven cranes would otherwise be required.

Operation is so easy that Cleveland Tramrail guarantees a starting effort of 15 lbs. and running effort of 10 lbs. per ton weight.

Write for free copy of illustrated booklet No. 2008, "Engineering and Application Data".

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7512 East 290 Street, Wickliffe, Ohio

For more facts circle 555 on Reply Card

I-T-E CURRENT-LIMITING "CORDON" Circuit Breakers

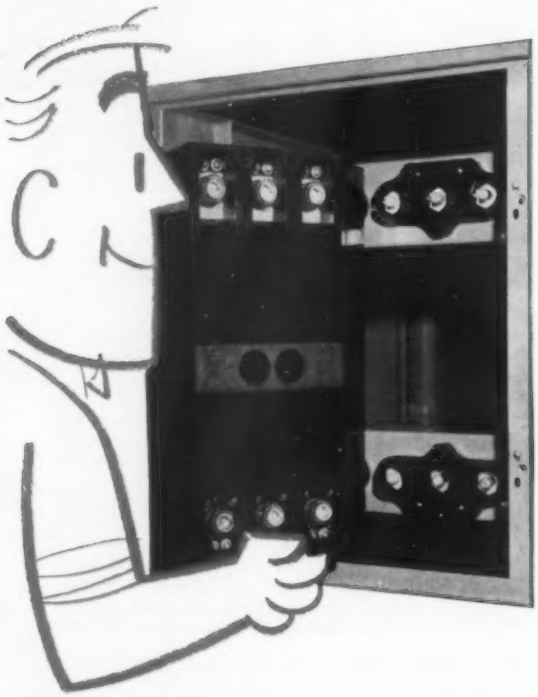
limit short circuit currents of high magnitude to a fraction of their possible value

"Cordon" Circuit Breakers combine current-limiting Amp-Traps* with standard thermal-magnetic molded case circuit breakers in a compact, integral design. They safely protect circuits where fault currents may reach 100,000 rms amperes, and also protect against sustained overloads and low magnitude short circuits. These current-limiting circuit breakers are now available as follows:

- A complete line—four frame sizes, 100, 225, 400 and 600 amp; 250 v d-c, 600 v a-c—with interrupting rating of 100,000 rms amperes
- With NEMA 1A and NEMA 12 enclosures
- With plug-in mounting for switchboard applications

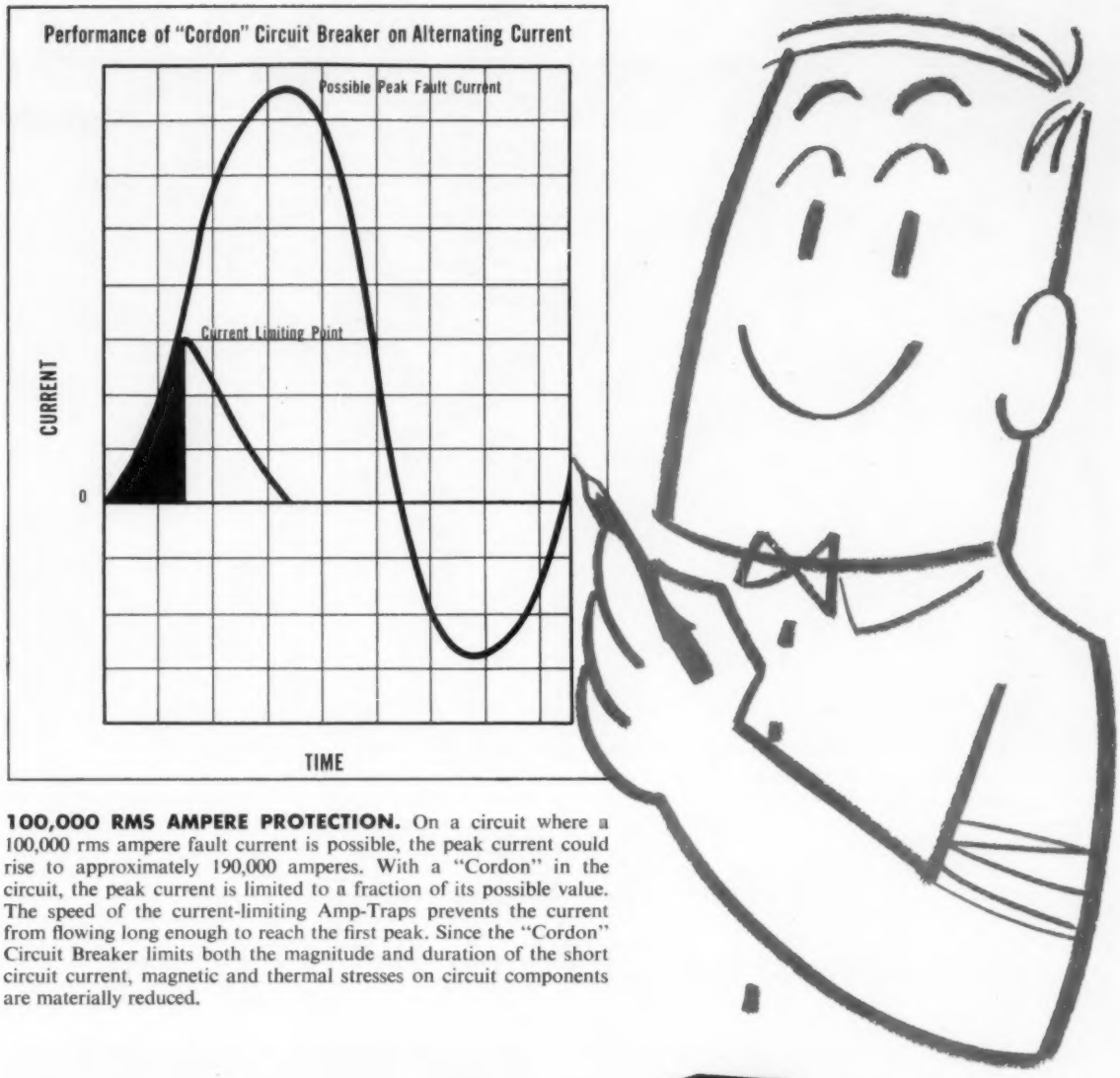
For complete information, contact your I-T-E representative. Or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Phila. 30, Pa.

**Amp-Trap is a registered trade-mark of the Chase-Shawmut Co.*



NEMA 1A AND NEMA 12 ENCLOSURES for housing "Cordon" Circuit Breakers are available.

FLEXIBILITY WITH PLUG-IN MOUNTING. Withdraw the breaker, insert another of the same frame size with the desired continuous ampere rating. No wiring changes. All "Cordon" Circuit Breakers can be supplied with plug-in mounting arrangement.



100,000 RMS AMPERE PROTECTION. On a circuit where a 100,000 rms ampere fault current is possible, the peak current could rise to approximately 190,000 amperes. With a "Cordon" in the circuit, the peak current is limited to a fraction of its possible value. The speed of the current-limiting Amp-Traps prevents the current from flowing long enough to reach the first peak. Since the "Cordon" Circuit Breaker limits both the magnitude and duration of the short circuit current, magnetic and thermal stresses on circuit components are materially reduced.

100 amp "CF" Frame | 225 amp "CK" Frame | 400 amp "CKL" Frame | 600 amp "CL" Frame

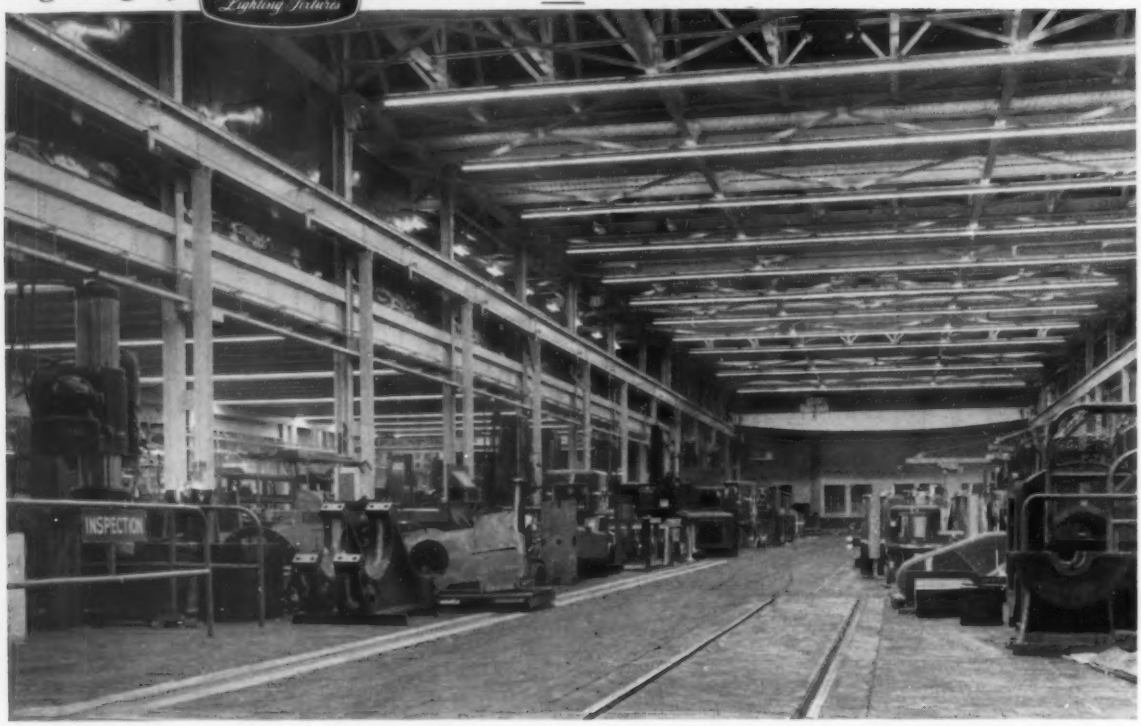
A COMPLETE LINE OF "CORDON" CIRCUIT BREAKERS from 15 to 600 amp, 250 v d-c, 600 v a-c

I-T-E CIRCUIT BREAKER COMPANY

Small Air Circuit Breaker Division

For more facts circle 556 on Reply Card

Lighting by DAY-BRITE Lighting Fixtures makes the big difference...

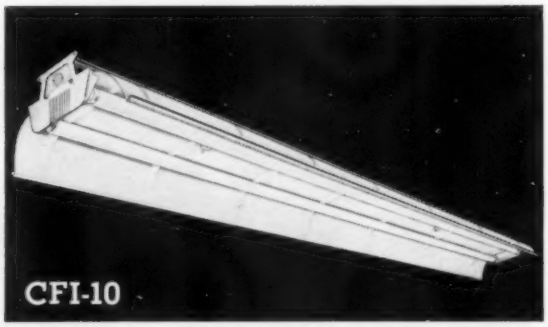


Versatility of New Day-Brite CFI Fixtures is illustrated in this recent high-bay installation for Beloit Iron Works, Beloit, Wisc. Mounted 29 ft. above the floor, Day-Brite's CFI-10 Industrial Fixtures with High-output Rapid-start lamps furnish an average of 40 ft.-candles.

High-bay – high-output
New Day-Brite **CFI** Industrial Fixtures

In this significant installation, both quality and quantity of light achieved with Day-Brite CFI (*Comfort For Industry*) fixtures are readily apparent. In addition, and of particular value in a high-bay installation, maintenance is greatly simplified. New High-output Rapid-start lamps with slotted openings in reflector tops permit natural updraft ventilation. This keeps reflectors cleaner longer—means extra light at no extra cost.

Before you decide on plant or office lighting, consult your Day-Brite representative. He's listed in your phone directory. Or, send for CFI literature.



Reduce eye fatigue—by directing a portion of the light upwards, harsh ceiling contrasts are washed out—eye fatigue and discomfort are greatly reduced—greater accuracy and improved production result.

61178

DAY-BRITE LIGHTING, INC.
5439 Bulwer Ave., St. Louis 7, Mo.

DECIDEDLY BETTER DAY-BRITE Lighting Fixtures

Nation's largest manufacturer of commercial and industrial lighting equipment

For more facts circle 557 on Reply Card

COURT DECISIONS — a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Defects in Manufacture

IN A RAILROAD maintenance and repair shop a workman was assigned to the installation of a heavy steel ash pan under a steam locomotive. To bolt a chain across the pan for lifting it into place, two holes were burned in the side for half inch bolts. With bolts affixed to the pan, the pan was placed in a pit beneath the locomotive by a crane. From there the pan was raised to its place under the engine, while the workman standing beneath the engine guided the pan into place.

Before it was in place, however, one of the bolts broke, wedging the workman between the pan and the framework of the locomotive. In the suit that followed, brought by the workman against the railroad, the Federal Court denied the workman the right to a recovery.

"The bolt was not manufactured by the railroad," said the court. "It was purchased by it in the usual course of business without notice of any defects. There was no evidence that the railroad knew or should have known it was defective. As a matter of law, such a purchaser from a manufacturer is not chargeable with negligence if, after passing it on to others in the usual course of business, it proves defective." Baltimore & Ohio Railroad v. O'Neill, 211 Fed. 2d 190, Ohio.

Postponement of Delivery Date

GOVERNMENT ORDERS for 820 sets of antenna masts were given a Maryland manufacturer. The contract provided for the delivery of 52 sets by June 15th, and further instalment deliveries until October 15th when the remaining sets should be delivered. Delivery dates however were not enforced and by October 1st only 52 sets had been delivered. On that date a demand was made for a complete delivery by the 15th of the month.

When these deliveries were not made, suit was brought against the manufacturer. In affirming the judgment for damages, the Maryland court said of the importance of contract delivery dates,

"In mercantile contracts, stipulations as to time are regarded as essential and a material provision of the contract, upon the failure or nonperformance, the purchaser is not bound to accept or pay for the goods unless they are delivered or tendered on the date specified in the contract and may rescind or repudiate the contract."

Then of the extensions of time granted the manufacturer and the peremptory demand for complete delivery, the court added, "Where a promissor before the expiration of the time within which a condition or a promise of the other party must be performed, manifests a willingness to extend the time of performance without specifying the length of the extension, he can by informing the other party of his purpose, fix a reasonable time within which the condition or promise must be performed." Velta v. McBride, 118 Atl. 2d 640, Maryland, December 5, 1955.

Limitation of Damages

ELECTRICAL EQUIPMENT, described as switch gear equipment, was purchased by a public service company. This equipment was contained in nine metal cubicles in a switch house. In operating the switch of one of these cubicles, an employee of the seller set off an explosion followed by a complete failure of power. Not only was that cubicle destroyed but others so badly damaged that replacements were necessary.

In the suit brought against the seller to recover the damages caused by the negligence of its employee, there was set up as a defense a clause of the purchase contract between this manufacturer and the public service company, that,

"The liability of the company arising out of the supplying of such apparatus, or its use, whether on warranty or otherwise, shall not in any case exceed the cost of correcting defects in the apparatus as above set forth and upon the expiration of one year all such liability shall terminate. The company shall not in any event be liable for indirect or consequential damages."

In its decision that under this clause the seller could not be held liable for these damages, the court said, summarizing the law governing such agreements,

"A bargain for exemption from liability for the consequences of negligence not falling greatly below the standard established by law for the protection of others against unreasonable risk of harm is legal, except a bargain for exemption from liability for the consequences of a willful breach of duty is illegal (a) if the parties are employer and employee and the bargain relates to negligent injury of the employee in the course of employment, (b) one of the parties is charged with a duty of public service and the bargain relates to negligence in the performance of any part of its duty to the public for which it has received or been promised compensation." Fire Association of Philadelphia v. Allis Chalmers Mfg. Co., 129 F.S. 335, March 14, 1955.

Instalment Deliveries

PURCHASER CONTRACTED for the sale and delivery of 5000 tons of steel billets and slabs, with a stipulation for monthly deliveries at the rate of 1000 tons. After 3000 tons had been delivered, the purchaser refused to accept further shipments, contending that the steel was not suitable for his purposes. The defective billets, however, had already been replaced by the seller. It should be noted that after the execution of this contract the price of steel had dropped between 15 per cent and 20 per cent.

When judgment was rendered by the Federal Court against the purchaser for this breach of contract he appealed, and the appellate court, in affirming that judgment, said,

"If the sellers in their performance of the contract delivered to the purchasers defective steel, the purchasers had the right to do either of two things but not both. That is, they had the right to reject and return the steel delivered and rescind the entire contract or else retain the steel delivered and claim and receive compensation for the defects. If they chose the latter course and retained, after discovering the defects, the steel already delivered, they were bound by their choice and could not rescind the contract on account of those defects." Clark v. Wheeling Steel Works, 53 Fed. 494.

Liquidated Damages

IN A CONTRACT for the manufacture and delivery of four hundred steel hopper cars it was provided, "It is agreed that in the event of the failure of the manufacturer to make and deliver the cars aforesaid within the time specified, then it shall forfeit and pay to the party of the second part as liquidated damages consequent upon

COURT DECISIONS

such failure the sum of five dollars per day per car for each and every day so delayed after the named delivery date."

In its defense to the claim of the purchaser for such liquidated damages for delayed deliveries, the manufacturer contended that this contract provision was not for damages but a penalty and as such illegal and unenforceable. In sustaining this provision as valid and enforceable, the Federal Court said,

"The parties to the contract stood on an equal footing, each represented by trained and intelligent men—each better equipped to measure the probable injuries which the railroad company would suffer than any court or jury is likely to be. They deliberately agreed that the standard for the measurement of the damages occasioned by losses of the railway company through these delays should be $5.00 per car for every day of inexcusable delay. This amount does not appear from the face of the contract to be greatly out of proportion to the actual damages which the railroad would be likely to sustain and no reason occurs to us why the courts should interpose to relieve the parties to this contract from the obligations which they have deliberately assumed." Pressed Steel Car Co. v. Eastern Railway Co., 121 Fed. 609.

Pattern Protection

PUMP PATTERNS in need of repair were entrusted in confidence by the inventor to a pattern maker. No patent protected the invention and these patterns, which made provision for an unequal expansion of the metals used, had been kept by the inventor in secret, although he had unreservedly sold the finished product.

When suit was brought by the inventor to prevent the disclosure of these details, the court sustained the right of the inventor to the protection he asked, irrespective of the lack of patent protection.

"The fact that one secret can be discovered more easily than another does not affect the principle. Even if resort to the patterns of the inventor was more of a convenience than a necessity, still if there was a secret it belonged to him and this pattern maker had no right to obtain it by unfair means or to use it after it was thus obtained.

"I think that the patterns were a secret device that was not disclosed by the publication of the pump and that the inventor was entitled to the preventive remedies of the court. While the pattern maker could lawfully copy the pump because it had been published to the world he could not lawfully copy the patterns because they had not been published but were still in every sense the property of the inventor who owned not only the material substance but also the discovery which they embodied." Tabor v. Hoffman, 23 N.E. 12, New York.

Engineering License Law

CONTAINED IN the charter of the City of Buffalo, New York, at one time was a provision prohibiting the granting of licenses to stationary engineers unless the applicant for the license had been a resident of that city for three years prior to the date of the application.

When a resident of Syracuse applied for a license and the application was refused the engineer sued for judgment that the charter provision was void as unjust, discriminatory and unconstitutional.

"There certainly is discrimination in favor of the residents of Buffalo as against nonresidents," said the court, "and such discrimination is fatal because it violates the Fourteenth Amendment of the Constitution of the United States. The state legislature no doubt had the power to authorize the municipality to enact an ordinance requiring applicants for licenses to run stationary engines within the city of Buffalo to submit to an examination as to their qualifications, but the legislature cannot restrict the issuance of such licenses or of licenses without grade classification, to engineers living in the city of Buffalo to the exclusion of nonresidents. Such a restriction is arbitrary, unreasonable and discriminatory as to nonresidents and interferes with their pursuit of their trades and callings." Williams v. M'Cartan, 212 Fed. 346.

Injury to School Boy

TWO YOUNGSTERS in New Jersey played "hookey" from school on what they called the chemical hill, a huge mound of chemical refuse, 50 ft or more in height. Refuse from a nearby refinery was dumped onto the pile from handcars. No fence enclosed the pile nor were there any warnings of danger.

After some time on the top of this refuse pile one of the boys, standing near the edge of the top ledge, was thrown by a cave-in to the ground and broke a leg as a consequence.

The refinery claimed that this 13 year old boy was of sufficient maturity to be capable of realizing the danger and, hence, guilty of contributory negligence. The court said:

"The rule of law under discussion cannot in our judgment adequately serve the social function which rationalizes its broad scope unless it is applied realistically. If the justification for expanding the liability of the possessor of land as to trespassing children is founded on the maturity of children and their consequent want of discretion and judgment essential to their own security, there is no place for the assumption in law that any particular child has shed his immaturity at any particular age. In this domain the law may wisely find its guide in the general sense of mankind. Nor should there enter the notion that at any given age the child 'should know better.'" Hoff v. Natural Refining Products Co., 118 A.2d 714, New Jersey.

Signatures

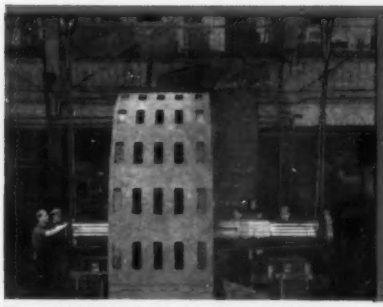
WHEN A CONTRACT, which by law was required to be in writing and signed by both parties, carried only teletyped signatures, it was contended, in a suit brought to enforce this agreement, that these were not true signatures.

In its decision, holding the teletyped names to be signatures, the Federal Court said, quoting from a decision by the South Carolina Supreme Court,

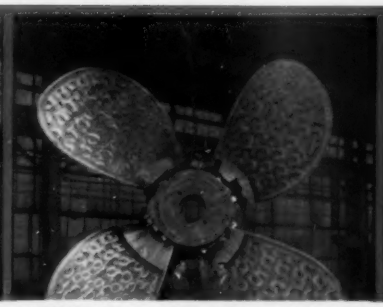
"A signature may be written by hand, printed, stamped, typewritten, engraved, photographed or cut from one instrument and attached to another, and a signature lithographed on an instrument by a party is sufficient for the purpose of signing it, it being immaterial with what kind of instrument a signature is made."

This the court supplemented with its own comment, "As the court understands the modus operandi of the teletype machine in modern business practice and particularly in connection with this lawsuit, each of the parties had a teletype machine in his office and as the machine was operated in one office it would type the message or memorandum simultaneously in the other office.

"Each party was readily identified and known to the other by the symbols or code letters used and there was no contention that the message did not originate in the office of the one and terminate in the office of the other. The point appears to be new but this court will hold that the teletyped messages in this case satisfied the statute as to the signatures of the parties." Joseph Denunzio Fruit Co. v. Crane, 79 F. S. 117.



Two ATLAS Type 1, 8-part Round-Braided Slings handling generator unit.



ATLAS Type 1, 8-part Round-Braided Sling used in Figure 8 hitch for handling ship propeller 22 ft. in diameter and weighing 71,500 lbs.

Two ATLAS Type 5 Whip Slings used with an assembly E Sling centering roll in lathe.

Material handling made safe, fast, and easy with BALANCED SLINGS!

ATLAS E-2 with Anchor hooks and Type 5 Whip Slings.

The balanced braided construction of ATLAS Slings results from Macwhyte's exclusive method of braiding endless right and left lay ropes. This method of braiding provides a balanced sling for safe, easy handling of a wide variety of equipment.

Because ATLAS slings are so lightweight and flexible, they are easy to use and save handling time.

Feel free to ask us for recommendations.

We will also make slings to your specifications.

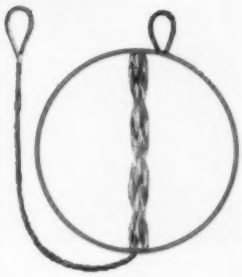
Here's ATLAS balanced braided sling construction

1 One right lay and one left lay wire rope are each spliced endless.

2 These ropes are hand-braided to form a round sling body.

3 All ropes in the body react in the same manner when loaded and each rope carries an equal share of the load.

4 These features produce a lightweight, flexible, kink-resisting sling that hugs the load for safe and economical handling.



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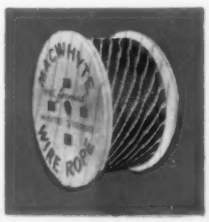
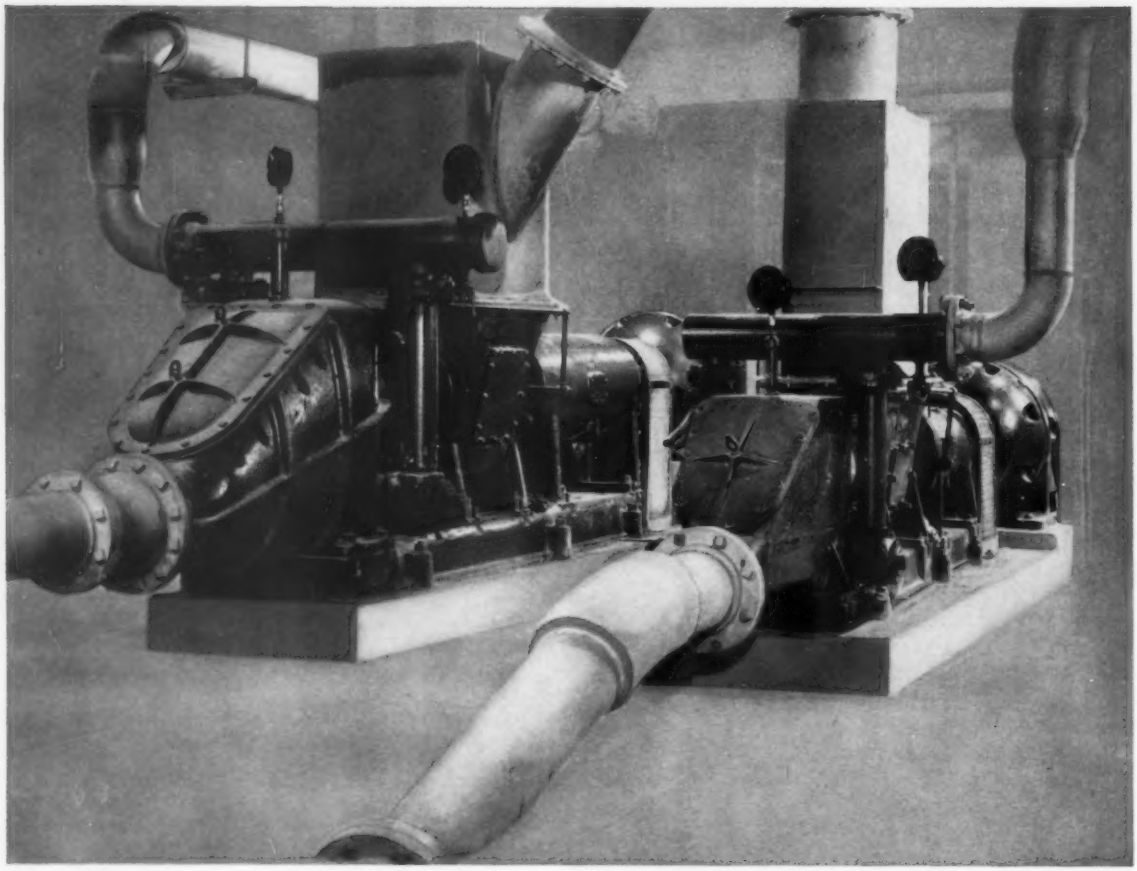


E1005

For more facts circle 558 on Reply Card

STOP MAKING A PROBLEM

. . . out of your bulk materials handling



Sure, your dry bulk materials handling system might break down now and then. Yes, maintenance costs do seem to be on the rise. But the materials must be moved even though the handling operation itself adds not a penny to the profit side of the ledger.

Obviously, the solution to all this is to move your materials as efficiently and economically as possible—with a Fuller-Kinyon Conveying System designed specifically for your operations.

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3020

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HOW TO USE HALLOWELL ADJUSTABLE SHELVING

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USE IT INDIVIDUALLY
OR IN COMBINATION

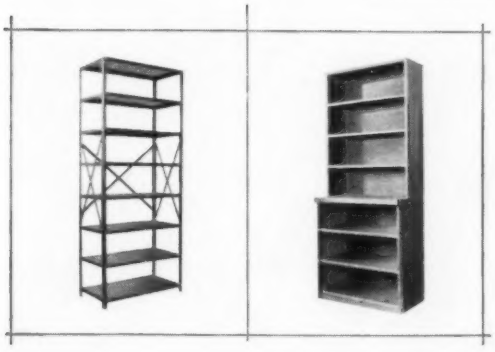
CLIP IN DIVIDERS

PUT IN SHELF BOXES

ADD SLOPING SHELF UNITS

AND
BIN FRONTS
AS NEEDED

ATTACH SWINGING
OR SLIDING DOORS



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ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Three Mahon Power Operated Rolling Steel Doors, 38'-0" x 14'-0", at the entrance to an enclosed subterranean shipping dock off a vehicular tunnel under "Northland", Detroit, Michigan. Owners: Northland Shopping Center, Inc. Architects: Victor Gruen & Associates. General Contractors: Bryant & Detwiler.

MAHON

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NEW AAF AFTER-CLEANER Saves Dollars as it Solves Dust Problems

Cutaway view of new AAF Type P-17 Cycoil Oil Bath After-cleaner.

Type P-17 Cycoil

- **traps finest metalworking dust**
- **lowers cleaning costs**
- **saves money on fuel bills**

AAF's new P-17 Cycoil Oil Bath After-cleaner is specifically designed to bring you extra dividends from your metalworking dust control equipment. By collecting the *finest* dust, the P-17 permits *recirculation* of cleaned air. This saves fuel dollars, prevents oxidation to building and eliminates the necessity of "dumping" exhausted interior air to the outside.

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The new P-17 Cycoil offers maximum cleaning efficiency, requires minimum floor space. Sludge may be collected in a remote settling tank for infrequent servicing during regular working hours. Make sure you get *all* the advantages of modern dust collection methods. Call your local AAF representative, or write direct for Cycoil information.

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Herman Nelson Unit Heaters

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New tool balancers boost production... relieve fatigue

Seven new Keller Tool Balancers designed to increase production . . . reduce fatigue . . . prevent tool dropping damage. Three models for light suspension of screw drivers, nut setters, drills, tappers. Four models for heavy-duty balancing in 20—30—40—50 lb. capacities.

- ★ **LONG SERVICE—oilless alloy bronze bearings.**
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Many other features. Ask for Catalog Section 65.

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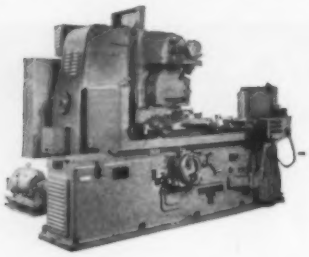
Thompson Precision Surface Grinder, Type C



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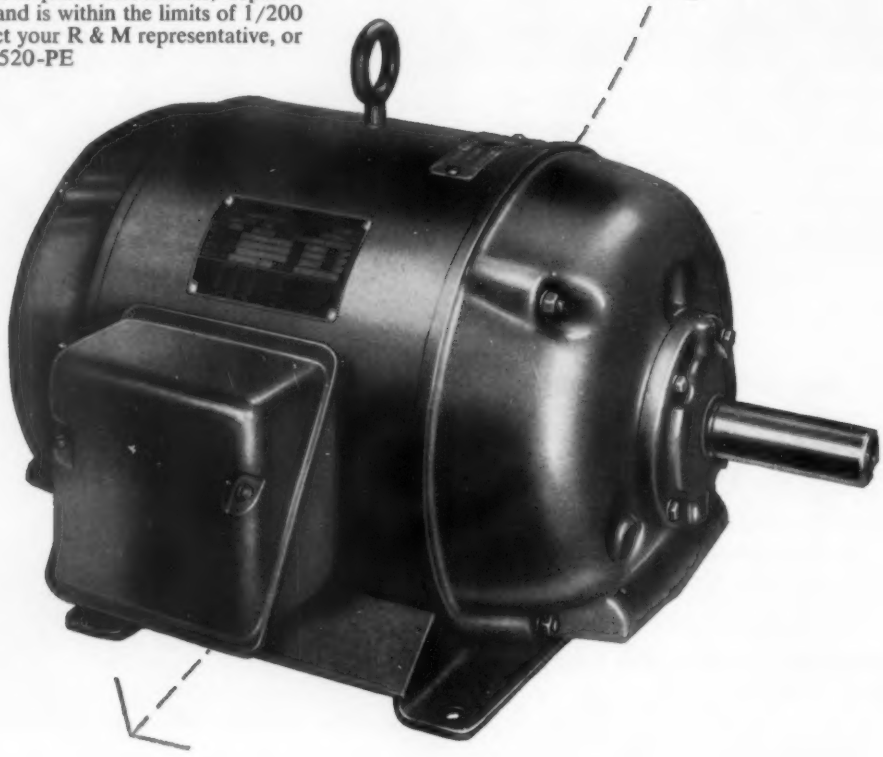
motor balance boosts Thompson precision!



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Box Score of Latin America Maintenance Survey

19,000 Miles to Interview
141 Industrial Leaders in
25 Plants with
23 Types of Manufacture in
10 Cities in
8 Countries

Plant Engineering in South America—

Differences, Similarities Mark Latin Practice

By JOHN KAMMELL, A. T. Kearney & Company, Chicago, Ill.
WALTER McINTOSH, Consultant, Chicago, Ill.

Plant Engineering Looks South—

Dream of Industrial "Manana" Coming True Today

Different engineering and supply problems, different personnel, different economies have produced a South American plant engineering that differs in many respects from ours—but with notable similarities . . . That's the report brought back by these two competent observers who toured South America for Plant Engineering magazine . . . Astonishing birth rates, low labor costs, short production runs, costly social benefits, make the Latin economy an interesting study in contrasts

BY WALTER McINTOSH, Consultant, Chicago, Ill.

EARLY THIS YEAR the authors set out on an assignment for PLANT ENGINEERING to bring back a story from the South American republics, on how South American industrial conditions compare with those in the United States. Here's the report, several months and twenty countries later:

First, we have to appreciate some of the achievements of Latin American industry. For example, Armour's meat packing plant in Sao Paulo produces sides of beef as fast as any known meat line in the world. Siderurgica, Brazil's newest steel mill, has the finest and largest type blast furnaces available. These and other items were gleaned from discussions with 141 industrial leaders in 25 plants (representing 23 different industries) in 10 principal industrial cities of South America.

Must Buy European

United States manufacturers will be interested to note that although the great preference is for United States production machinery, many South American manufacturers are forced to switch to European equipment because of lower price or unfavorable trade balances which simply make it impossible to buy from the United States. Other plus and minus factors are illustrated by present conditions in Brazil, where the labor rates are advantageously low, but internal transportation difficulties often limit a manufacturer's market to a localized area. This in turn necessitates short production runs and results in higher costs. A general summary of these conditions appears later in this article.

North Americans looking at photos taken of flourishing Latin cities are apt to be taken aback and will remark that "their cities look as developed and modern as ours." This "new look" is understandable in light of a more recent commercial building cycle. While the faces of our great cities were molded in the last years of the nineteenth and first quarter of the twentieth centuries, many Latin cities have completely new facades in terms of the last decade or two.

Let's look at Sao Paulo, for example. Thirty-five years ago it held half a million people. Today it is six times as large—well over three million. Industrial growth is no less astonishing, with the value of production increasing fiftyfold in the same period. In addition to the giants, there are cities the size of Pittsburgh that many of us have never heard of: Porto Alegre, Recife, Salvador. Then there are many comparatively small towns between thirty and a hundred thousand where industry is decentralizing similar to the trend in our country.

High Birth Rate

Currently, Latin American population is increasing at a rate higher than for any major world area—2½ per cent a year compared to 1½ per cent in the United States. This trend, if continued to the end of the century, means a total of 400 million—greater than the projected population of the United States and Canada combined. However, the South American market is not so closely tied to population growth as is ours. In many Latin countries, market evaluation disregards 50 to 90 per cent of the population as customers for anything but the most basic goods. The gradual inclusion of these people—as their living standard rises—will provide an effective population growth far greater than the

About the Authors

Walt McIntosh

Walter McIntosh, after a hitch in the Navy and graduation from Northwestern University, entered the domestic construction field in 1947. Three years later he joined Hanna Engineering Works, eventually becoming responsible for sales and advertising. In this capacity Mr. McIntosh came in contact with a broad cross-section of industry; he left Hanna to take part in this survey of plant engineering practices in South America. Mr. McIntosh has also made similar surveys and studies throughout Europe.

John Krummell

John D. Krummell, a mechanical engineering graduate of the University of Wisconsin, later supplemented his education with advanced study in business administration and accounting. Mr. Krummell has been employed since 1946 by A. T. Kearney & Company, a leading management consulting firm located in Chicago. It was in this connection that Mr. Krummell gained experience in maintenance cost reduction work. He has also traveled extensively in Europe. He will soon join Reliable Electric Company, Chicago, as production manager.

Table I. This table shows clearly why the great majority of South American countries, with low dollar exports cannot become good importers of dollar goods

Country	Population	Exports to U.S.	Exports per capita	Imports from U.S.	Imports per capita
Brazil	55 million	680 million	$ 12.40	450 million	$ 8.20
Mexico	27 million	327 million	12.20	620 million	23.00
Argentina	20 million	106 million	5.30	122 million	6.10
Colombia	11 million	505 million	46.00	339 million	30.70
Cuba	6 million	400 million	66.50	425 million	71.00
Venezuela	5 million	502 million	100.40	528 million	105.60

simple percentage of birth rate would indicate.

This may be likened to the market development based on inclusion of blue-collar population segment, experienced in the United States and Europe over the last century. It is borne out by a current expansion rate in overall Latin economic activity of 5.4 per cent yearly, compared to 3 per cent in the United States. Estimates indicate that Latin American imports from the United States by the mid-1970's may be $6 to $7 billion, a figure more than twice the current rate.

There has been much speculation about the dangers in commerce with the South American countries due to political instability. W. R. Grace Company, who has been active in Latin America in at least eighteen fields of endeavor, reports that in 100 years of operation they have "never lost a dollar nor a square foot of land through expropriation." Great notoriety was gained by the 1938 Mexican oil expropriation. However, the oil producers were warmly welcomed by a sister republic, Venezuela, and arrangements have proved most profitable to both the country and the producers ever since.

No Buy, No Sell

This leads us into the big problem insofar as the market for United States products is concerned. Since the Latin countries cannot become buyers without also becoming sellers, and thus build up dollar credits, it is necessary for them to develop so-called "dollar crops." This has been done with varying success as can be seen from Table I. Note particularly the critical column "Exports per Capita." This sets the ceiling on foreign purchasing power.

In terms of population, Brazil, Mexico and Argentina should be very substantial customers. Almost without exception the republics are interested in purchasing United States goods. The country that is best able to do so is Venezuela. With a population 9 per cent that of Brazil, imports from the United States are 110 per cent as great as Brazil's. Brazil and Argentina simply don't have "dollar crops" comparable to their size differential. In Brazil, dollar credits must be taken up by oil and wheat imports, leaving very little to be spread over the vast population for importation of United States goods. A possible solution to this problem lies in the development of oil and other mineral resources, of which vast reserves are believed to exist.

In Argentina the problem is expressed in terms of competitive and complementary economics. Argentine exports are mostly agricultural for which she must import agricultural and industrial machinery. She can carry out this reciprocal trade best with economies that are primarily industrial—West Germany, England, France and Italy. The United States has ample agricultural production without requiring Argentine beef or wheat. Therefore, extensive trade with Argentina is not reasonable to expect. In general, the markets we find in Latin America will be dependent upon *our ability to absorb their products,* along with *their ability to increase production of new "dollar crops."*

Among the first items of general business interest one finds in Latin America is a high-cost money market. Banks pay 5 per cent on savings accounts; well-secured loans go at 14 per cent; yields on industrial investments often run 20 to 40 per cent, (including stock dividends).

Successful coffee, cocoa and banana plantations, once in production, return 40, 50, and even 100 per cent. Certain cattle estancias in Argentina and fazendas in Brazil are reported to do as well.

However, things are not so simple as that for the dollar investor. Although in five years he may have tripled his money in the national currency, if he should wish to buy dollars back he may have to pay a rate three times that for which they were sold. Net gain—zero. Moreover, with an annual cost of living rise of 20-30 per cent (23 per cent Sao Paulo—

Table II. Comparisons of area, population, income and other economic statistics for thirteen of the South American countries surveyed and the United States

Country	Estimated Population (Millions)	Area (Sq. Miles)	Annual Income ($ U.S.) for 1949-1952 Per Capita	Annual Income ($ U.S.) for 1949-1952 Total (Billions)	Cost of Living Index (1948=100)
South America					
Argentina	19.1	1,080,000	$ 290	$ 5.1	380
Bolivia	3.2	420,000	100	.3	1,200
Brazil	58.5[1]	3,290,000[1]	220	11.8[1]	210
Chile	6.8	290,000	260	1.6	550
Colombia	12.7	440,000	250	2.8	160
Ecuador	3.7	110,000	80	.2	110
Guianas	0.8	170,000			
Paraguay	1.6	160,000	70	.1	1,500[1]
Peru	9.4	480,000	110	1.0	180
Uruguay	2.6	70,000	250	.6	160
Venezuela	5.8	350,000	420[1]	2.2	120
Total South America	124.2	6,860,000	$ 230	$ 25.7	280
United States	165.2	3,020,000	$1,850	$290.4	110

Other Comparisons (Figures for Recent Years)

		Total So. America	United States
All-Weather Roads	(Thousands of Miles)	100	2,000
Railroads	(Thousands of Miles)	65	222
Telephones	(Millions)	2	50
Electricity Generated	(Billions of KWH)	20	440
Coal Production	(Millions of Tons)	6	505
Oil Production	(Millions of Bbls.)	740	1,970
Passenger Cars	(Millions)	1.0	48.5

[1]Highest figure.

Here's What the Authors Asked:	This is What They Learned About			
1. Name of plant	Vestex	Alpargatas	Arno, S. A.	
2. Location	Santiago, Chile	Buenos Aires	Sao Paulo	
3. Products	Clothing	Shoes	Elec. Motors	
4. Area under roof, sq ft	160,000	1,400,000	145,000	
5. Total number of employees	1,000	14,000	1,400 plus	
6. Number of production employees	800	11,000	1,150	
7. Number of maintenance employees	45	1,000	20	
8. Who is responsible for plant engineering?	Prod. Mgr.	Ch. Engr.	Fact. Mgr.	
a. Is there a plant engineer?	Yes	By function	No	
b. Who is responsible for maintenance if not the plant engineer?	Mast. Mech.	Ch. Sect. Mech.	Dept. Mech.	
c. To whom does he report?	Prod. Mgr.	Ch. of Sect.	Dept. Head	
9. What is included under plant engineering?				
a. All maintenance and minor adjustments?	Yes	Major work	Major work	
b. If not, who makes minor adjustments?	Mast. Mech.	Ch. Sect. Mech.	Dept. Mech.	
c. Buildings and grounds maintenance?	Plant Mgr.	Ch. Engr.	Fact. Mgr.	
d. New construction?	No			
e. If not, who supervises new construction?	Plant Mgr.	Ch. Engr.		
f. Janitors and sweepers?	Asst. Plant Engr.	Ch. Engr.		
g. Machine shop?	Mast. Mech.			
10. What about preventive maintenance?				
a. Is maintenance "preventive" or "breakdown"?	Breakdown	Preventive	Preventive	
b. What maintenance is on a regularly planned schedule?				
1. Lubrication?	Daily	Weekly	Daily	
2. Electric motor inspection & overhaul?	As needed	Weekly	Weekly	
3. Machinery inspection?	As needed	Weekly	Daily	
4. Roofs and buildings?	As needed	Weekly	Monthly	
11. What stock of spare parts is carried?	For 700 sewing mach.	25,000 items	3-8 Mos. supply	
a. Available locally or abroad?	Local, Limited	Captive Shop	Make some	
b. Delivery time	Indefinite	4-6 Mos.	3-8 Mos.	
c. Are parts in separate maint. storeroom?	Yes	Yes	Yes	
d. Are parts on card-type inventory control?	For ordering	Yes	Yes	
12. Are maintenance shop facilities adequate?	Yes	Yes	Yes	
a. One general shop or crafts separate?	General	General	General	
b. Number of shop employees	15	1,000		
c. Type of shop equipment	Metal Working	Metal Working		
13. Who selects new equipment?	Plant Prod. Mgr.	Top Management	Top Management	
a. Who supervises its installation?	Mast. Mech.	Ch. Engr.	Dept. Heads	
b. Where is equipment purchased?	USA; Germany	USA; England	USA; Europe	
14. How about buildings?		No diff.	No. diff.	
a. Wall construction material	Bricks			
b. Steel beams or concrete	Reinf. Conc.			
c. Open air; heating, air conditioned	Closed, heated		Heated	
d. Age of building years			2½ yr.	
15. Are there special facilities for employee care, housing, or recreation facilities?	Many social benefits		Subsidized Meals	

1953), income can be quickly dissipated.

Often hidden wages are another burden on industry. In one country, the employer pays workers thirteen months' pay for ten months' work. Two months, more or less, of the year are accumulated in paid vacations and paid religious and political holidays. The extra month's pay is in terms of social and retirement benefits. This is somewhat of a compensation for the low wage rate of $10 to $25 per month.

But high absenteeism and low productivity are again on the other side of the ledger. Moreover, South American manufacturers generally produce for local markets due to transportation and other difficulties. Production runs are relatively short, with attendant high unit costs. Then there is an inability to utilize local resources. It is related that during the construction of the Madeira-Mamore Railway in Brazil, it was found more economical to import jarrah crossties from Australia than use the plentiful native timbers cluttering the right-of-way.

This leads us into problems of transportation. South America is generally typified by rugged terrain. Where not mountainous, it is often swampy with dense tropical forest and undergrowth. The development of both highways and rails has been impeded by such geographical and physical barriers. Furthermore, where railroads have been built (usually by Europeans) the gages vary—three different widths are employed in Argentina, and five in Brazil. Naturally, this has been an impediment to progress. The cost of shipment by rail over relatively short distances can often be higher than sea transport from abroad.

To ease the shortage of dollar credits, and for other political and economic reasons, the two countries which should, because of their great area and population, be our greatest markets, Argentina and Brazil, are

Nine of the Leading South American Industrial Plants

	Duratex Sao Paulo Compos. Board	Siderurgica Volta Redonda Steel	C.A.-Colgate Palmolive Caracas Toiletries	Vidraria Sao Paulo Glass	West Indies Sugar Santiago, Cuba Sugar	El Triunfo Lima, Peru Shoes
	100,000 130 100 10	 10,200 6,700 1,700	70,500 233 100 15	530,000 3,350 3,000 200	200,000 430 400 15	100,000 435 360 5
	Prod. Mgr. By function Gen. Plant Mgr.	Plant Engr. Yes Supt. Operations	Plant Supt. No Plant Supt. Gen. Mgr.	Indust. Dir. By function Maint. Engrs. Indust. Dir.	Chf. & Plant Engr. Yes Mill Mgr.	Plant Engr. Yes Supt.
	Yes Gen. Plant Mgr. Yes	Yes Special Dept. No Special Dept.	Major work Station Adjuster Plant Supt. Plant Supt. Plant Supt.	 Foreman, Sheet Metal Administrator Administrator Administrator	Yes Mgr.; Village Boss Mill Mgr.	Yes No Cons. Engr. Personnel
	Preventive Yes Yes Yes Yes	Preventive Yes As needed Yes As needed	Preventive Daily Semi-annually Weekly Not sched.	Breakdown Scheduled As needed Periodic As needed	Preventive Daily Periodic Periodic Yearly	Both Periodic {Minor-Monthly {Major-Yearly Yearly
	Abroad 3-8 Mos. Near Machs.	Imported 6-8 Mos. Yes Yes	$20,000 2½-3 Mos. Yes	$2,000,000 USA 8 Mos. Near Machs. Yes	"Large Quantity" Made own shop 14 hr - 30 hr Maint. Storeroom	Year's Supply Made own shop If bought 3-6 Mo. Yes Yes
	10 Mechanics	Excellent General 1500 Gen. Metal Wk.	15	Yes Crafts Shops 100 For making parts	General 15 Metal Working	General 5 Metal Working
	Management Plant Supt. Europe	Plant Engineering Spec. Installers USA	Sweden	Indust. Dir. Dept. Head USA	Top Management Mgr. & Plant Engr. USA	Plant Engr.; Supt. Plant Engr.; Supt. Europe
	Concrete Open air New Cafeteria & Medical Care	Reinforced concrete Structural steel Open air 1-10 yrs. Many community benefits		 Open air 2, 10, 40 yrs. Dispensary, Dentist, Restaurant	 Steel frame No heat; Closed 40 yrs. Homes; Movies; Golf Club	Brick Medical care, nursery

cultivating their own industry. When a manufacturer establishes production and obtains government recognition of his ability to supply the market, protective tariffs are set up which virtually eliminate imports.

This plan is working out relatively well with the exception of products whose manufacture is characterized by high capital investment and long production runs such as automobiles. These items, together with fuel, are large dollar drains and there is thought of setting up more stringent import restrictions to conserve dollar credits for essential imports.

Many United States manufacturers, who for years have enjoyed a comfortable market in the ABC countries, are now practically excluded. Markets can be salvaged only by setting up manufacturing plants in those countries as long as currency difficulties continue. In some cases, the United States company will have a strong stock position alongside national shareholders.

Percentage of U. S. ownership is sometimes determined by the limiting laws of the particular country . . . sometimes by political expediency. In other cases a license system is set up. Generally, unit royalties are paid in return for design drawings, trade name or mark, and in cases, tools and dies.

Some United States companies have found that their partially owned South American subsidiaries provide a greater yield on investment than could be hoped for from the stateside operation. Contributing causes are: 1. Freedom from imported competition because of protective tariffs and dollar shortages. 2. Freedom from local competition because of the industrial youth of the country. 3. Labor rates a fraction of stateside wages for like work. 4. Process and methods freedom—not subject to union arbitrations. 5. Low or negligible corporate and personal income and real estate taxes.

Plant Engineering Practices in South America

By JOHN KRUMMELL, A. T. Kearney & Co., Chicago, Ill.

NOW LET'S GET DOWN to plant engineering: The box score shows that overall industrial practices among South American industries are much the same as in the United States, with the following general exceptions:

Parts and Service Far Away. Most of the areas visited are not yet heavily industrialized; therefore, they do not warrant the establishment of sales-service agencies by equipment and supply manufacturers (Lima, Sao Paulo, and Caracas are notable exceptions). There is little production of basic machinery and machine tools in South America as yet. For the most part, plant machinery is purchased abroad, either in the United States, Europe, or Japan. Delivery of replacement parts ordered from overseas may take 3 to 8 months, depending upon the source; in countries experiencing economic difficulties, such as Chile, parts may not be obtainable at all due to a shortage of foreign currency.

These conditions are being corrected rapidly in countries such as Peru and Venezuela, where industry is expanding rapidly, exchange rates have been stabilized, and parts can be imported profitably. On the other hand, many existing sales-service agencies for foreign equipment have closed up or turned to other businesses in countries such as Brazil and Argentina. In these countries the balance of trade is unfavorable, dollars are rationed for essential goods, and foreign exchange is not available to import non-essential types of machinery and parts.

Larger Maintenance Shops and Parts Inventories. A typical Latin firm carries a rather high inventory of spare parts when judged by U. S. standards. Furthermore, maintenance shops are large and completely equipped, as they have to be prepared to make many parts which a North American firm would normally expect to buy on short notice. For example, the Grace Corporation has a complete maintenance machine shop with 280 employees at its Paramonga Sugar Estate in Peru, including a small foundry and forge. These facilities are considerably larger than those which would be required for a comparable operation in the United States.

Maintenance Personnel Versatile. A plant engineer south of the border has to know his equipment inside and out, and he demonstrates a versatility which borders on genius. He becomes a master at improvising, for when factory representatives are several thousand miles away, the cost of bringing them to his plant for help is usually prohibitive. There is rarely a local service group to handle such specialty items as armature winding and instrument repair. He soon finds himself to be a jack of all trades and master of many.

Make It Yourself Plan. Many plants make every production item they need down to the last nut and bolt. It is not uncommon to find that a plant has become a fully self-sustaining operation. In fact, this practice was forced in Chile until recently by a law imposing a 9 per cent manufacturer's tax on the resale of component parts. When the tax law was passed, Chilean plants turned to making component parts and sub-assemblies themselves in order to avoid this tax. Thus, they have tended to develop as small, high-cost integrated operations instead of as specialized, high-production, low-cost plants. (Similar tax legislation has been introduced in some states of this country). The development of integrated production facilities in Latin America, however, is largely due to smaller markets (which can give only limited support to suppliers of component parts and sub-assemblies), and to exchange regulations (which restrict the import of inexpensive mass-produced items from other countries).

Unbelievably low wages prevail in most Latin American countries except Venezuela. Minimum wage for a factory worker is about a dollar a day. The highly developed social benefits offered by both industry and government are partial compensation for low take-home pay. Many small plants are equipped with medical, dental and recreational facilities for their workers and their families. For example, El Triunfo, General Shoe's Peruvian subsidiary with approximately 500 employees, has a dentist, a hospital room, a company cafeteria, and even a nursery to take care of the children while mother is at work. Holidays are frequent and bonus-retirement coverage is broad. A worker in Colombia is entitled to over 20 paid holidays per year, plus a full month's "bonus" pay.

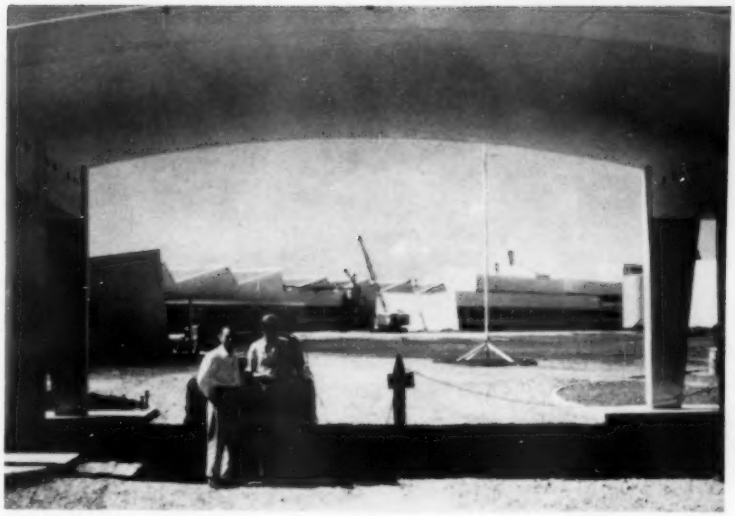
Following the practice long established in Europe and in remote areas of this country, plants in outlying districts, such as Brazil's fine new steel mill at Volta Redonda, provide excellent employee housing at trifling rentals. The company may build a church, a motion picture house, a community center, athletic fields, and more,

Brazil's newest and largest steel mill at Volta Redonda, between centers of Rio de Janeiro and Sao Paulo. Capacity of this mill is 1,000,000 tons per year

depending upon the degree to which the facilities of the local community are developed.

Maintenance is typically the responsibility of each production department supervisor. The concept of independent staff functions such as plant engineering has not yet been so clearly defined in Latin America. Therefore, supervisory personnel are often given wider responsibilities than in the United States. This is particularly true of smaller plants under Latin ownership; U.S. owned subsidiaries tend to be organized along the lines with which we are familiar. There is no record of plant engineering societies such as the American Institute of Plant Engineers functioning in South America.

Plant buildings are generally of an inexpensive concrete or plastered brick type of construction. Latin architects are skilled in the design of concrete structures in which very little steel is required. Frequently there is no need for heating because of the favorable climate. Open-sided buildings are seen around Lima where it almost never rains. The prevailing type of lightweight, open-air construction, coupled with low material cost and low labor rates, makes possible the erection of buildings at ⅓ to ⅔ the cost of a comparable structure in the United States. (Venezuela is a notable exception, where the oil boom has driven wages and material costs to levels higher than those in the U. S.



Duratex, fine new wallboard plant near Sao Paulo, has all Swedish equipment

Latin American plants look very much like those in North America except for the materials used in construction, and the high brick or adobe wall which completely surrounds the property in keeping with Spanish custom. Typical is Industrias Reunidas in Lima, a leading manufacturer of enamelware and stamped metal products. Newer buildings are almost invariably of modern architecture.

More Preventive Maintenance Needed. Equipment in the 25 plants visited was well cared for. Good maintenance is of vital importance because of the difficulty in obtaining replacement parts and the lack of standby production facilities. There are some outstanding examples of scheduled maintenance, particularly where interruptions to production could not be tolerated or replacement parts are hard to come by. In general, however, maintenance is handled on an "emergency" basis rather than by preventive scheduling.

In Brief: These Are Some of the Plants

El Lagarto

This small leather goods plant is primarily a producer of items made from alligator skins such as purses and belts. The entire operation is under one roof, from the alligators swimming in their storage tanks to the processing of the hides and the assembly of the finished products. Plant engineering problems for Senora Rosa Martinez, the owner and manager, are at a minimum due to the large proportion of hand work in relation to the amount of machinery.

Antonio Rabat & Son

No business trip to South America could be complete without a visit to one of the producers of world-famous Chilean wine. The musty cellars and huge wooden casks of this long-established winery are in keeping with the old-world tradition for producing fine wines which the Rabat family has brought to Chile. Yet modern plant engineering technology now finds its place alongside the wine-maker's art. New high-speed bottling and carbonating lines have recently been built, there is bottling machinery to be maintained, and the large pumps and lines which carry wine in the making from one vat to another require daily cleansing and care.

Ensamblaje Venezolana

This Chrysler assembly plant is said to produce units which are more satisfactory units for Venezuelan use than competitive cars and trucks shipped from the United States. Special care is taken in welding and assembly, as road conditions outside of the Caracas area will remain severe until the present national road-paving program is nearer to completion. The maintenance organization in this fine one-story plant is largely concerned with the upkeep of the fabricating, painting, and material handling equipment, as virtually no parts manufacture is carried on in the plant.

Indulatex

Like many small new Latin American firms, this Argentine manufacturer of latex yarn is remarkably productive and profitable. The yarn is used in stockings and clothing, and is the only latex yarn made in Argentina. The product is made from liquid latex; it is peeled off continuously from electrically heated endless steel bands 1600 ft long. Much of the machinery and control equipment was designed and built under the supervision of Sr. Federico Michl, Technical Director. A 500 hp diesel drives the generator producing Indulatex's power.

Sedeco

This fine rayon weaving plant of 1500 employees is located just outside Medellin, one of Colombia's three principal cities. Medellin, with a population of 365,000 and expanding industry, is caught in an acute electric power shortage. There is only 100,000 kw of generating capacity, owned by the city, whereas considerably more is required to handle the present load. Plants like Sedeco (a sub-

Aerial view of Paramonga, W. R. Grace & Co's huge Peruvian installation which includes a sugar refinery, alcohol distillery, and a paper mill with 30,000 ton annual output

sidiary of Coltejer) therefore maintain complete standby diesel, hydraulic, or steam-generating facilities which in fact are almost constantly in use (Coltejer has a steam-generating plant with a capacity of 20,000 kw). Coltejer has several other textile plants and a total employment of 6300. Its president is Carlos Echavarria, a graduate of New York's Columbia University, who returned to his native Colombia and is a respected civic as well as business leader.

Sindelin

The remarkable growth of this home appliance company lays down a challenge to other Chilean manufacturers. Fine sales promotion, and emphasis on engineering of quality products at low cost, have sparked the development of Sindelin from a handful of employees in 1950 to a bustling organization of 100 which has just moved into a new building. The name Sindelin has become a household standard in Chile for vacuum sweepers, fans, and home mixers. With the recent move to a new plant has come the development of production lines and an emphasis on good plant engineering practices, but no formal maintenance organization has yet been appointed.

Eltex S. A.

This important Brazilian manufacturer of elastic cloth, like many of its Latin neighbors, is literally "growing like Topsy." Today there are 400 employees. Sales are rising so rapidly in the booming Brazilian market that construction of new concrete building additions and upper floors for the plant has proceeded almost without letup for the past five years. Yet, productive capacity still trails the sales potential. Lower floors of the buildings house machinery for weaving wide bolts of material. The basic machine is the traditional type of large horizontal loom guided by punched cards, which is still standard after several decades. On the upper floors of the same buildings, intricate continuous lace and band patterns are woven by the latest types of automatic equipment with dozens of spindles zigzagging and dodging each other at high speed around a maze of guide slots in hardened steel tables.

Eltex designs and builds many of its special weaving machines in a fine small machine shop. This shop, and the maintenance of 460 motors and 2000 machines, are the responsibility of the chief engineer.

This photo shows contrasting type of plant producing farina, a widely used table food. This one-man mill is located in a small plant on the Amazon River near Manaos, Brazil

Paramonga

W. R. Grace & Co. was probably best known in this country until recently for its shipping and foreign trade operations. However, Grace has long been an American "Ambassador at Large" in the Latin business world. Grace first started operation in Peru over a hundred years ago when William Russell Grace in 1854 became a partner in a Peruvian ship chandler company, Bryce & Co. From this modest start, Grace & Co. has grown gradually and then rapidly in Peru to a present investment in excess of $60,000,000, with business activities ranging from sugar production to paint

The plant of Shellmar, an extremely modern manufacturing entity located in Sedeco near the industrial center of Medellin, Colombia. This plant produces cellophane and plastic

manufacture. In 1927, Grace purchased Paramonga, an amalgamation of several small sugar plantations comprising about 9,000 acres under cane cultivation.

Paramonga is located along the coast about 120 miles north of Lima. There are 3,900 workers, and administrative employees and approximately 10,000 inhabitants in all at Paramonga, including families. The raw sugar produced from the cane is converted to refined sugar in the sugar refinery, which has an annual output of approximately 50,000 tons. In addition, Paramonga has installed a distillery producing about 1,000,000 gal of high grade alcohol yearly, a caustic soda plant of 1,300 ton annual capacity with liquid chlorine, hydrochloric acid and ethyl chloride as by-products, and a paper mill with a yearly production of 30,000 tons of board and paper.

The paper mill has three machines and was the first mill of record to successfully convert sugar cane bagasse into paper. Newer power plant boilers and much of the other machinery at Paramonga is out of doors because of the extremely dry weather conditions; precipitation of any magnitude at Paramonga is very rare. The maintenance organization totals 800; it includes a permanent construction force of about 120, as well as 40 electricians, 60 millwrights, 60 power plant employees, and 360 in the mechanical and electrical shops. The well-stocked maintenance store has a complete inventory control system with 20 clerks; transactions and recordkeeping are complicated by the necessity of keeping every record in both Spanish and English.

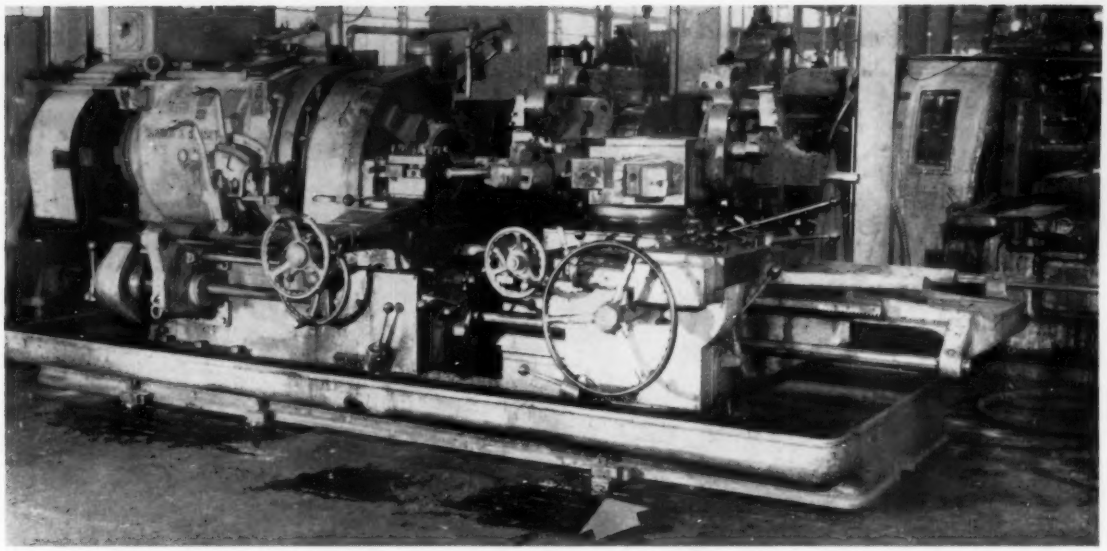


Fig. 1. Like other machine tools, turret lathe was installed on "production perfect" mounts (arrow) of vinyl, sisal, cork

Production Methods Change—

Caterpillar's P. E. Group Keeps Pace

TALK WITH any production man and he'll tell you that his machine tools have to be installed "tight" as well as level. Talk with any plant engineer in charge of installing the machines and he'll give you several logical ways to get the desired results. He might grout the machines in concrete, or bolt them in lead. Or, he could find a way to cement machines to the floors.

For many years, tools at Caterpillar Tractor Company's Peoria, Ill. plant had been bolted in lead. The machines certainly stayed put and once leveled, stayed that way for all time. Then new tooling and present-day production techniques changed things. Problem put to the Plant Engineering Group at the Peoria plant was to change a "technically perfect" installation method into a "production perfect" method. Basic requirements for the sought-after method would be:

1. Absolutely fool-proof installation which would remain secure during operation of many types of machine tools.
2. Completely level installation of each machine.
3. Vibration and noise control to permit greatest possible machine and man efficiency.
4. Flexibility which would permit easy re-locating of machines to meet constantly changing plant layout requirements.

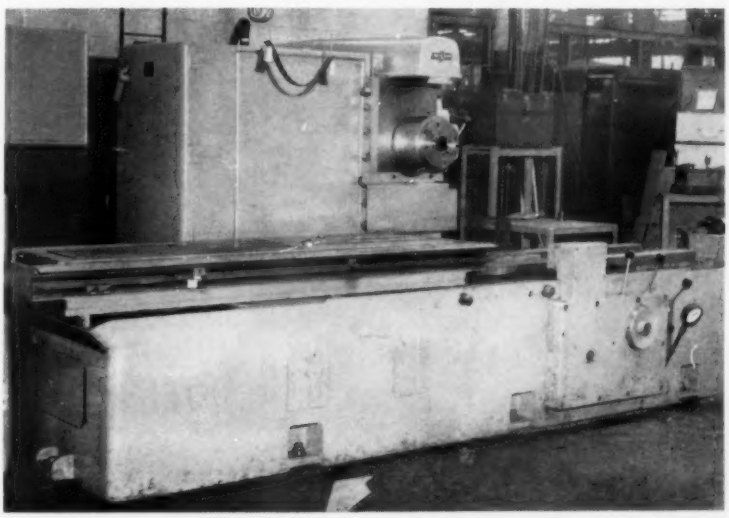
After a survey covering all known methods of machinery installation, the department heads came up with an answer which seemed to meet all four conditions adequately.

No Bolts, No Cement

Answer proved to be a patented mount made of vinyl, sisal and cork. Machines placed on the mounts did not have to be bolted or cemented, could be easily shimmed to perfect level, and could be operated immediately after installation. Transmitted vibration and noise were reduced to a great extent in each case. Today, between 350 and 400 tools in the Caterpillar plant are installed on mounts cut with a circular saw from sheets of Air-Loc vinyl, sisal and cork material. The serrations on each side of the mounting material are 0.060 in. deep and provide a high coefficient of

(Continued on page 226)

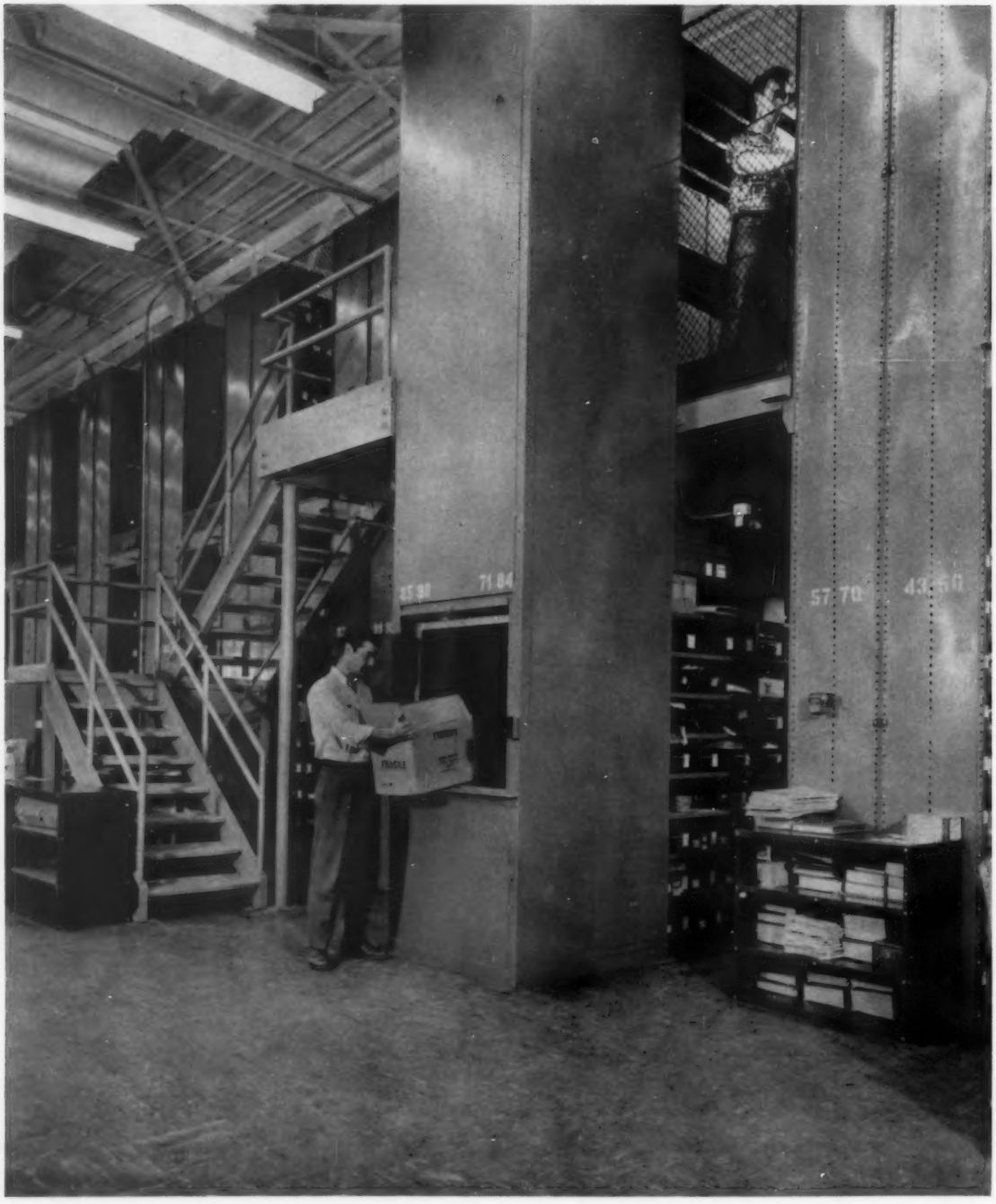
Fig. 2. Grinder at Caterpillar plant was installed without bolting or cement



High Space Utilization Factor Obtained

Western Electric's Mezzanines Save Production Space

By A. W. WATSON and W. O. AMEEN, Factory Planning Engineers, Western Electric Co.



With These Double-Deck Storerooms

WESTERN ELECTRIC'S new plant at Winston-Salem, N. C. was built to partially consolidate various activities of the Company's Radio Division, previously carried on in leased quarters in the area. Each of these subordinate locations had their own storage and supply setups which was unavoidably costly to operate because of inventory duplication and obsolete facilities.

Consolidation of these storeroom facilities was a major consideration in the planning of the new plant. By cutting inventories to a minimum and assessing additional requirements, it was figured that storage space would be needed for 65,000 (11 by 19 in.) tote pans. This would necessitate using about 2500 standard (24 by 36 by 84 in.) rack sections to handle the anticipated load. Conventional floor space requirements for racking of this extent would run almost 60,000 sq ft which was practically double the space allotted for two major storerooms in the building plans.

To better utilize the space available, it was decided to try and double-deck both storerooms. As there was 18 ft of clearance between the floor and the bottom of the trusses the project offered definite possibilities. Then too, the planned elevators, extended to serve the mezzanine floors of the storerooms, gave us another advantage. But could commercial storage racks carry the load of a mezzanine floor system as well as the added shelves with their loads?

Using samples of uprights from various shelving material manufacturers, a series of tests was made for strength evaluations. All material tested proved adequate.

Based on the test results, commercially available shelving was selected and ordered through competitive bidding. The uprights were standard 1½ by 1½ by ¼ in. "rolled tees." The shelves were "class 2," fastened by studs and clips.

The mezzanine floor system was designed by Western Electric engineers at Winston-Salem and is made of structural steel using 6 in. junior beams fastened directly to the uprights by means of a standard support bracket.

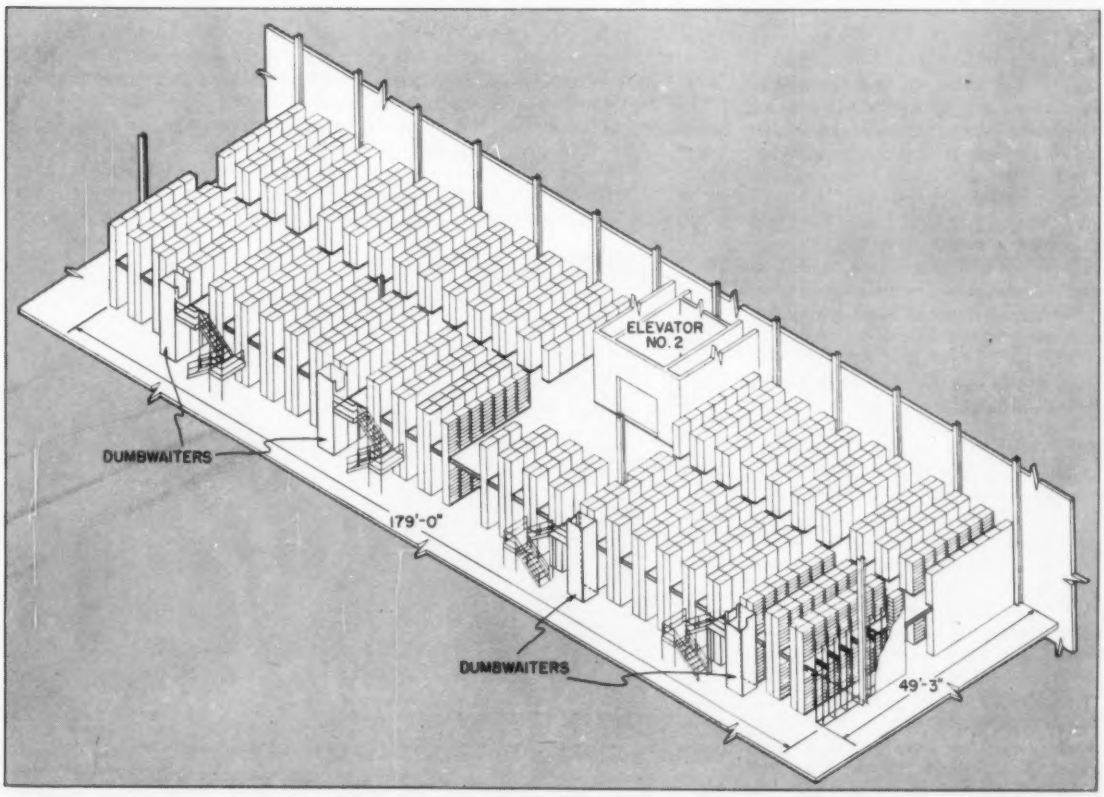
Floors differ in the two storerooms. In one, the first to be constructed, 18 ga steel roof decking was used, topped by a ⅛ in. sheet vinyl over ⅜ in. wearing surface composed of liquid rubber mixed with volcanic dust aggregate troweled on. The other floor consists of steel subway grating with 14 ga sheet steel tack welded to the top. A ¼ in. wearing surface containing cement mixed with a latex-water emulsion binder was used on the sheet steel.

A large freight elevator serves the upper level of each storeroom and is supplemented by four (36 by 36 in., 500-lb capacity) dumbwaiters for handling smaller loads.

Lighting of the mezzanine floor of the storerooms is the fixed type as used for general plant lighting. Single 4-ft, 2-tube fluorescent fixtures mounted on trolley duct provide lighting in each of the aisles below.

In use for approximately a year the completed installation has proven adequate insofar as storage is concerned. It has provided almost 112,000 sq ft of storage space at a cost only slightly higher per square foot of shelf space than comparable facilities using considerably more floor space.

Maintenance has been non-existent with the exception of difficulties encountered with the flooring in heavily traveled areas (including the main aisles and the area directly in front of the elevator). Those areas containing the cement-latex binders will be replaced with a more suitable type of material as soon as tests are complete to determine the replacement. The steel decking with the ⅛ in. vinyl will remain as initially installed except a portion at the elevator entrance which will require a sheet steel plate tack welded to the decking for reinforcement before the new vinyl is installed.



This is an isometric view of one of the two double-deck storerooms; photo on opposite page shows area near dumbwaiters

About the Author

Dr. H. C. Hardy obtained his PhD from Pennsylvania State University in 1941. He majored in physics with his main research in acoustics. Dr. Hardy did research during World War II at Harvard Underwater Sound Laboratory and later, at the University of Pennsylvania, in short range communications. For 11 years he was supervisor of acoustic research at Armour Research Foundation. He is a Fellow of the Acoustical Society of America and President of the Greater Chicago Noise Reduction Council.

How To Control Industrial Noise—

Part I. Background Data in Acoustics for the Plant Engineer

Noise control is of growing concern to plant engineers in many industries today . . . This series of articles by a recognized authority will attempt to explain the rather complicated terminology of the acoustical engineer and the methods he uses in solving noise problems . . . While all the material will be highly useful in setting up noise control projects and writing noise specifications this first article is rather general in nature . . . The next two will deal with indoor and outdoor noise problems

By DR. HOWARD C. HARDY, Consultant in Acoustics, Chicago, Ill.

PERHAPS THE MOST significant accomplishment in the modern industrial revolution has been the change in the environment of the worker and the better appearance of the plant. While two generations ago, good lighting and ventilation was unusual, and cleanliness and absence of air pollution was the exception, these conditions are minimum standards for American industry today. Being rapidly added to the list are good internal appearance (painting, tiling, etc.), air conditioning, and *internal noise control.*

For many years the American industrialist has also taken pride in the outside appearance of his productive facility, and it has been learned that here again, noise control has been one of the most important factors in his relations with community neighbors.

Some time ago accident liability claims and nuisance suits provided the biggest spur to improved environmental conditions. Later it was learned that such conditions made for higher productivity and better public relations. Today the plant with the better appearance and working conditions often finds itself with the pick of the labor market and with much less labor turnover.

A great impetus to noise control activity after the war was caused by liberalization in some states of the rules of workmen's compensation in awards for hearing loss. On the other hand, the writer finds it significant that of the more than a dozen plants on which he has worked on the internal noise in the last year, only half of them used hearing protection as their criterion. The other half had simply comfort as the design goal.

It is also a significant fact that noise control problems have no permanent solution. Larger and faster machines built for more productivity usually make for more noise. In this running fight for better acoustic conditions, only a start has been made. It is probable, therefore, that the plant engineer will be spending a larger percentage of

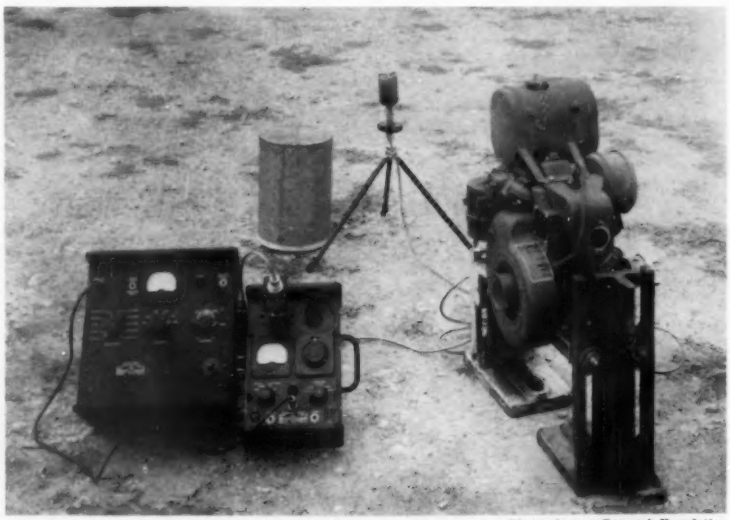


Photo: Armour Research Foundation

Fig. 1. Sound level meter, left, and octave band filter, right, shown measuring the noise output of a portable gasoline engine. Cylinder in back is a wind screen

What's All the Noise About?

Sound pressure is the amount the atmospheric pressure instantaneously differs from the equilibrium pressure due to the passage of a sound wave.

Sound pressure level is a logarithmic comparison of the sound pressure to a reference sound pressure. It is specifically twenty times the logarithm to base 10 of the ratio of the sound pressure to 0.0002 dyne per square centimeter. Sound level meters are calibrated to read in decibels.

Loudness is the subjective rating of the magnitude of the sound. It is dependent mostly on the sound pressure level but also varies with frequency.

A **sone** is an arithmetic loudness unit such that 20 sones is twice as loud as 10 sones. The value of one sone is arbitrarily chosen as a 1000 cps note of a sound pressure level of 40 db.

A **phon** is a logarithmic unit of loudness level related to the sone by the relation $\log_{10}S = 0.03P - 1.2$. For a pure tone of 1000 cps, it is the same as the sound pressure level.

Frequency is the rate of repetition of a periodic motion. The unit is cycles per second.

An **acoustic spectrum** is a distribution of many sounds over many frequencies. Noise sources are quite often almost continuous spectra. When this is true, it is convenient to measure the frequencies in bands each an octave wide (two to one in frequencies) and the instrument for doing this is an octave band filter. The measurement is designated as octave band sound pressure level, or more often octave band level.

A **sabin** is the unit of sound absorption equivalent to the absorption of one square foot of a totally absorbing surface.

Transmission loss is the difference in decibels between the sound energy striking the surface separating two spaces and the amount transmitted. It is not measured directly but computed from sound pressure level measurements on both sides of the partition.

his time in the future on noise control problems. It will also be necessary for him to be concerned more and more with acoustical specifications in procuring materials and equipment.

The object of this article will be, therefore, to present in laymen's language some of the more important concepts of the acoustical engineering language so that the reader will be more familiar with this terminology. In subsequent articles the writer will discuss in turn specific solutions to indoor and to outdoor noise problems.

Noise Terminology—A plant engineer needs to know simple noise terminology in order to evaluate performance and write specifications. It is not possible to make single number descriptions of noise problems. This is because there is no instrument which replaces the complicated mechanism of the human ear and its connecting nervous system.

There are many physical parameters of noise, but the most important two are intensity and frequency. Intensity effects are measured with a sound level meter which, with certain limitations, measures the sound pressure level of the noise in decibels. It is possible with an octave band analyzer to determine how much sound intensity is present in different bands each an octave wide. On the standard meter these bands are, in cycles per second: 37.5-75, 75-150, 150-300, 300-600, 600-1200, 1200-2400, 2400-4800, and 4800-9600. The low frequencies, 37.5 to 300 cps, designate bands which sound like hums and thuds (the bass end of the piano keyboard); the middle frequencies, 300-2400 cps, sound like roar or clangs; and the higher frequencies, 2400-9600, sound like hiss or clicks (the high treble end of the keyboard).

In Fig. 1 is shown a conventional sound level meter and octave band filter. The data of some industrial noises taken by such a meter are shown in Fig. 2. For other data the reader is referred to the excellent survey by Karplus and Bonvallet.[1]

One of the main reasons for taking these data in this manner is because the ear is much more sensitive to high frequencies than low frequencies. The low frequencies are much less loud, less annoying, less likely to cause hearing loss, and they contribute very little to interference with speech communication. The difference may be as much as 30 decibels.

How Loud?

One of the most useful pieces of information which can be calculated with the data mentioned above is the loudness. This is done by the chart shown in Fig. 3. When the sound level is plotted in such a chart, the loudness of each octave band can be read off the scale on the left. The total loudness is the loudness of the loudest band plus 0.3 the loudness of the remaining bands and is each computed by the scheme given in the lower hand corner of the chart. Some sound engineers use a logarithmic unit of loudness level called the phon, which is related to the sone by the scale relationship given in the chart.

Design Goals—By use of octave band analysis, it is possible to set up design goals which are reasonable for different operating conditions. A set of such curves is given in Fig. 4. The

[1] "A Noise Survey of Manufacturing Industries," H. B. Karplus and G. L. Bonvallet., American Industrial Hygiene Association Quarterly., Volume 14, pp 4-32, December, 1953.

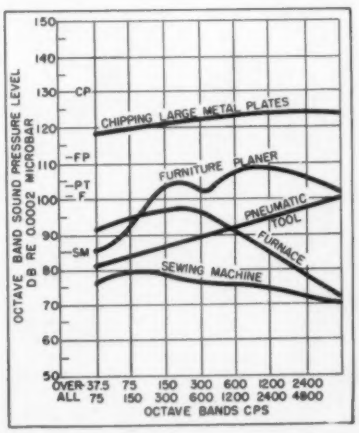


Fig. 2. Sound levels of some typical industrial noises. Although the pneumatic tool and furnace have equal sound level, the former is more annoying

Table I. Transmission loss of structures composed of familiar building materials

Octave bands (cps)	37.5 75	75 150	Transmission loss (decibels) 150 300	300 600	600 1200	1200 2400	2400 4800	4800 9600
1. Plasterboard, ⅜ in. on both sides of studs	6	10	25	30	35	41	42	45
2. Steel partition, pre-fabricated	15	20	23	28	30	34	37	40
3. Brick tile, 4 in. thick, plastered on both sides	28	31	33	35	38	41	44	54
4. Cinder block wall, 4 in. hollow, no surface treatment	25	27	30	35	41	47	48	49
5. Same with one coat of cement paint	31	36	41	46	52	56	57	58
6. Poured concrete, 12 in. thick	39	47	54	58	61	64	65	66

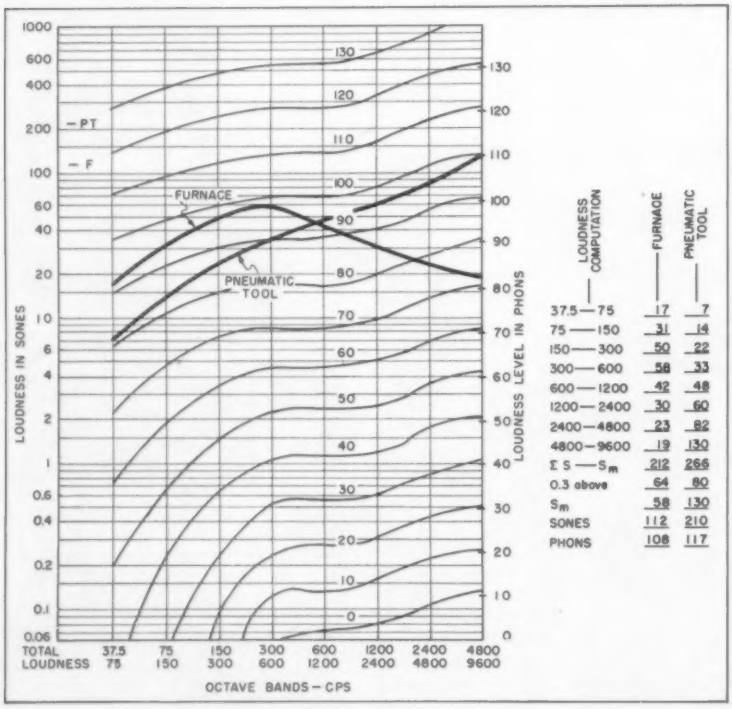
second curve from the top is a curve from an earlier article[2] setting up the limit below which industrial noise will probably not produce hearing loss even though there is exposure over many hours per day for many years. One of the most important factors in the hearing loss problem is the exposure, and for occasional exposure the limit given in the upper curve would most probably not cause permanent hearing loss.

In order to conduct conversation at three feet, the levels should not exceed that given in third curve. With noise which exceeds the constant daily exposure limit, it is only possible to conduct conversation by shouting close to another's ear. For quick test, therefore, the ability to conduct conversation is a fair prediction of whether the environment is safe for long time exposure.

The three lower curves are maxima which it is found should not be exceeded by industry near the boundary line of the nearest residence or commercial district, as the case may be. When these limits are exceeded, it is found that complaints generally will be registered. Setting a design goal for a community noise maximum is a complicated technical problem, however, and it will be discussed in a future article.

[2] "Tentative Estimate of a Hearing Damage Risk Criterion for Steady State Noise," H. C. Hardy., Journal Acoustical Society of America., Volume 24., pp 756-761., November 1952.

Fig. 3. Loudness curves of two machines from Figure 3. The pneumatic tool is almost twice as loud as the furnace although it is only one decibel more intense



Acoustic Power—Only a small amount of engineering is involved in sound radiation. With most machines less than one part in ten thousand of the power available is converted into acoustic power. We cannot measure acoustic power directly, but under certain conditions it can be computed from the sound pressure or by comparison with a known power source. If the sound is radiated uniformly into space, and it is sometimes outdoors, the power in watts P_o is given by

$$P_o = 0.28\ p_o^2 r^2 \times 10^{-4} \ldots\ldots (1)$$

where p_o is the sound pressure in dynes per sq cm and r is the distance from the source in feet.

When sound is confined indoors, it travels rapidly and is reflected by the walls and other objects in the room. Soon a state of equilibrium is reached where just as much energy is absorbed as is being radiated. Under these conditions, except very close to the source, the power indoors is given by

$$P_i = 0.56\ p_i^2\ A \times 10^{-6} \ldots\ldots (2)$$

where p_i is the sound pressure level measured indoors and A is the total absorption of sound in the room in square feet. This is obtained by multiplying each square foot of area by its present absorption and taking the sum. The absorption of factory areas will run between 1000 and 30,000 sabins (absorption units) depending on their size.

Figure 5 is nomograph giving the relation between sound power and sound pressure level for different distances and interior absorption. For instance, a sound power of one watt will give a sound pressure of 100 db, if there are 4500 sabins in the room. The same level will be obtained with the same power from a uniform source at 9.5 ft. With only 450 sabins in the room, the level would be 110 db.

From the figure and equation (2) one can see that doubling the absorption will reduce the sound 3 db, increasing it tenfold will reduce the sound 10 db. Doubling the distance from source to receiver will lower the sound 6 db, a tenfold increase will lower the sound 20 db.

Sound Transmission—Another problem often encountered by the plant engineer is sound transmission through building walls. The difference in level (L_1—L_2) between two rooms will depend on the transmission loss of the wall in decibels (TL), on the absorption in the receiving room A_2, and on the area of the radiating wall, S. The relation is

$$L_1 - L_2 = TL + 10 \log_{10} (A_2/S) \ldots\ldots (3)$$

Increasing the absorption of the receiving room ten times increases the apparent transmission loss by ten

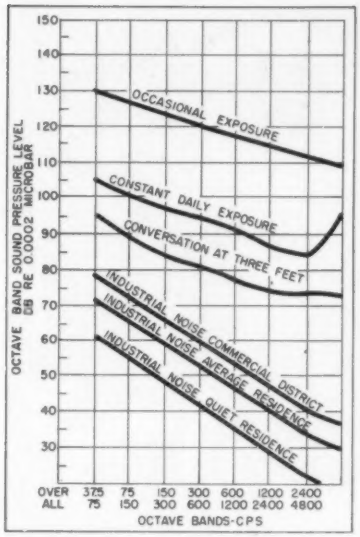


Fig. 4. Proposed limiting octave band levels for different conditions. Curves shown range from the average industrial noise in a quiet residential district to noise levels where only occasional exposure of the human ear is advisable

decibels. When going from indoors to outdoors, the sound level (db) just outside the intervening wall L_o is

$$L_1 - L_o = TL + 6 \quad \ldots\ldots\ldots (4)$$

The 6 db come about because of the different levels of sound field inside and outside the wall.

TL for walls and floors are listed in many books.[3] Some of the simpler structures are given in Table I. All these data are for solid walls without an opening of any kind. In actual practice, few walls are as good as their laboratory rating, for the simple reason that there are other paths for the sound, such as holes, piping, etc. If a wall has an opening for instance, equal to one part in a hundred of its total area, the wall cannot have a transmission loss of greater than 20 db. For a 40 db wall, the opening could not be greater than one part in ten thousand.

The effect of other leaks in the wall can only be evaluated by a well qualified acoustical engineeer. In most cases the leaks are more important than the type of material used. A generality can be stated for all except the most excess sounds, such as jet engine test stands. Any wall structure which is not porous and is free of openings and which is sufficiently strong mechanically will usually have sufficient sound transmission loss.

It is hoped that the data in this issue will be helpful to the plant engineer in evaluating the claims of material and equipment sales distributors. It can provide the basis for a more accurate and realistic specification. There are three important principles in writing such specifications which, if carried out, will make both buyer and seller happier. These are:

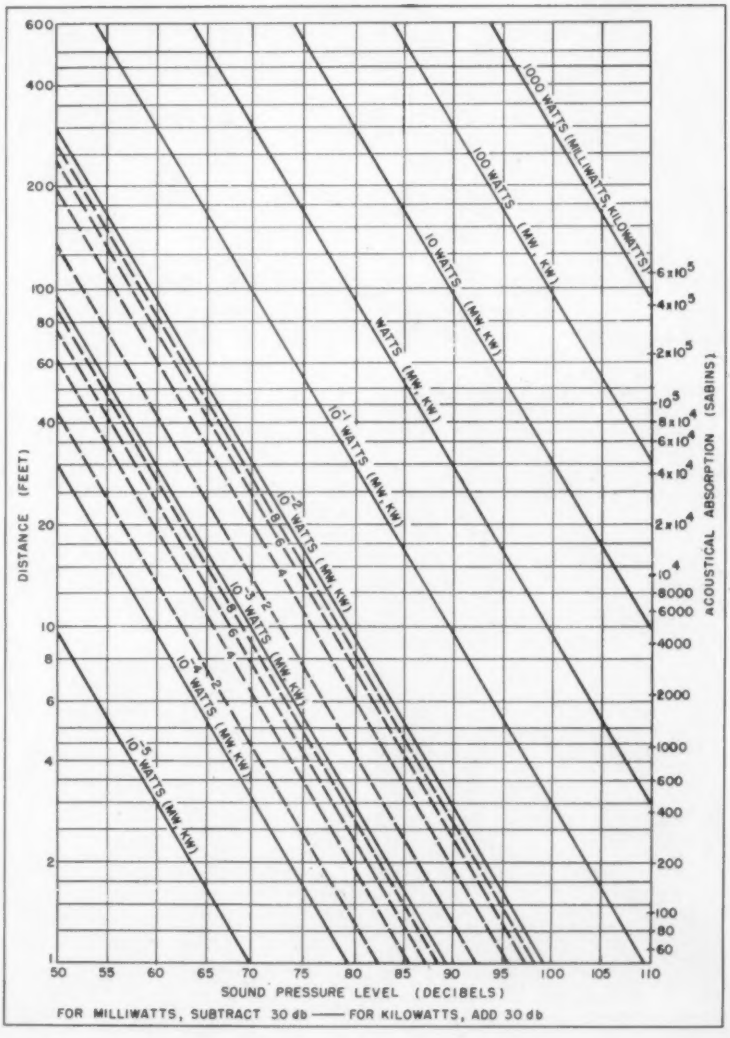
1. Specify realistically the tolerances desired. Remember when giving decibels you are already dealing with logarithms and large magnitude. For instance, if 35 db drop is adequate, do not ask for 70 db because it is "twice as good." Actually, 70 db is 3000 times as effective as 35 db. Similarly, do not ask for background noise at low frequencies of 60 db, if 85 db will do. Such impossible requests will usually produce bidders with equally impossible claims.

2. State specifications in terms of frequency analysis. The reasons for this are given above. If eight numbers appear to be excessive, the least that can be done is to give a specification in a low frequency band and another in a high frequency band. Although imperfect, this will give two bracketing numbers for the supplier to shoot at.

3. State specifically where the measurement is to be made, for instance, "at a distance of three feet," "in the center of the room," "on the northern property line," etc. When the specification is for the noise reduction between two points, give both descriptions.

Conclusion—It is impossible to give a complete acoustical engineering curriculum in one short article. The above data should, however, furnish the important basic information. In subsequent articles, specific information will be given on the analysis, measurement, control of indoor and outdoor noise.

Fig. 5. Nomograph relating the quantities of sound power, sound pressure level in decibels, and distance (outdoors) or sound absorption in the room (indoors)


1000 WATTS (MILLIWATTS, KILOWATTS)
100 WATTS (MW, KW)
10 WATTS (MW, KW)
WATTS (MW, KW)
10⁻¹ WATTS (MW, KW)
10⁻² WATTS (MW, KW)
10⁻³ WATTS (MW, KW)
10⁻⁴ WATTS (MW, KW)
10⁻⁵ WATTS (MW, KW)
DISTANCE (FEET)
ACOUSTICAL ABSORPTION (SABINS)
SOUND PRESSURE LEVEL (DECIBELS)
FOR MILLIWATTS, SUBTRACT 30 db —— FOR KILOWATTS, ADD 30 db

[3] "Acoustical Designing in Architecture," V. O. Knudsen and C. M. Harris., John Wiley & Sons, Inc., 1950.

Fig. 1. Flexible ducting provides efficient way to exhaust paint and welding fumes in coach building shop

FLEXIBLE TUBING WORKS ITS WAY AROUND PLANT

For Handling Gases, Liquids, or Dust

Have You Tried Flexible Tubing?

Fig. 2. Ducting and dust hoods move with polishing and buffing wheels

IF YOU'D LIKE to eliminate the fitting and alignment problems that installations of rigid ducting can present, it will pay you to investigate the advantages of flexible ducting in your plant. In plants throughout the country, flexible ducting has been proving itself in the handling of air, gases, liquids, fumes, and a variety of materials that can be handled effectively by blowing, suction or gravity.

Flexible ducting can be "snaked" around constructions and, when outlets to be connected are misaligned, it flexes to make an easy connection. Where a moving element is present, as in the case of dust and abrasive exhaust from a moving grinder head, flexible ducting will move easily with the element.

Component materials vary widely, depending upon the character of the air, gases, liquids, fumes, or semi-solids to be handled, and the conditions of flexing and abrasion that the ducting will encounter.

Duplicating lathes in the plant of the Sterling Last Company throw off a quantity of sawdust and hardwood chips (see Fig. 3). Exhausting these was a real problem with rigid ducting, since the cutters move from side to side in the course of shaping the last. Attempts to accomplish this with rigid ducting involved the use of cumbersome universal joints, which were heavy, noisy, and did not permit really free movement of the exhaust system in following the cutting process.

The rigid ducting system was replaced with an installation of Spiratube, which follows the movements of the automatic carriages. Because it is light in weight, it does not impede the operation. Examination after more than two years of use showed practically no wear in spite of the abrasive character of the materials removed.

Ability to move freely was an important factor that recommended the use of flexible ducting in the exhaust system of automatic polishing and buffing machines (see Fig. 2). Heads and wheels must follow the complicated contours of the work, and ducting and dust hoods must move with the wheels.

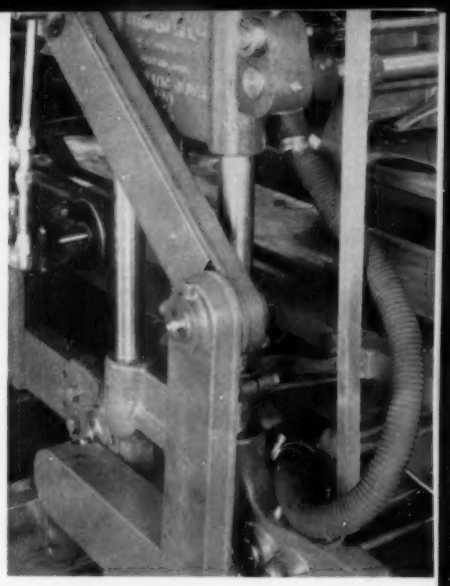
Handling an installation like this with rigid ducting has proved both inefficient and expensive, because special fittings are involved, and the universal joints rapidly develop leaks and are noisy in the bargain. This installation uses flexible tubing which flexes in any direction, and lengthens and retracts with the movement of the machine.

An installation of flexible tubing in the painting and welding division of Twin Coach Company exhausts paint and welding fumes rapidly. The tubing can be brought immediately to any working point, and pulled up out of the way when operations are completed (see Fig. 1). Because of the size of the coaches built here, flexible ducting offers an efficient way to handle exhaust problems; its flexibility eliminates the need for ball and socket joints that would be required if a similar installation were to be attempted with rigid ducting.

Another type of flexible ducting, for the circulating glue system of this Standard Knapp Division gluing machine, which provides a large internal diameter with a thin, strong, reinforced wall, has successfully replaced the cumbersome conventional hose originally used on this equipment (see Fig. 5). Constructed of spirally wound bonded layers of neoprene coated sheets and cotton fabric with wire helix reinforcement, the ducting resists both internal and external abrasion, and provides free movement for the elements in the glue system of this machine.

Fume-filled tanks can delay production in a good many plants like the Metz Brewing Company, in Omaha, Neb. The bottling tanks, shown in Fig. 4, formerly were left open a full day before they were sufficiently free of carbon dioxide fumes to permit a man to go in and clean them. A suction exhaust system, connected to the tanks by flexible tubing, now clears them of gas in less than an hour. The ducting can be moved from tank to tank as required, and can be let into the tank for any necessary distance.

In the monotype casting department of the print shop of Hartford's Travelers Insurance Company, the heat, smoke and oily fumes of hot lead type, are removed by means of flexible tubing, increasing the comfort and safety of this operation a good many times (see Fig. 6). Flexibility is important here, and the ducting can easily be pushed to one side for resetting and adjusting of the casting machines.



Figs. 5 and 6. Flexible tube, above, forms part of glue circulating system. At right, heat and fumes are removed from monotype machines

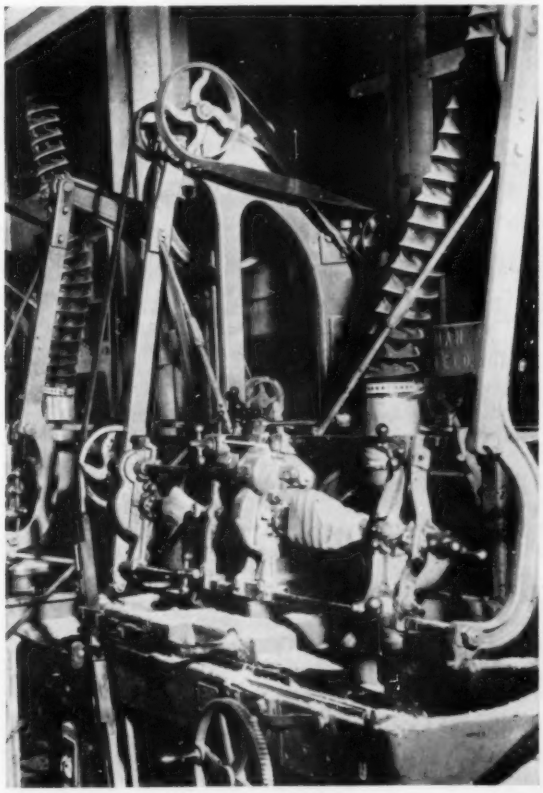


Fig. 3. Sawdust and hardwood chips from duplicating lathes are exhausted through flexible tubing which follows cutters

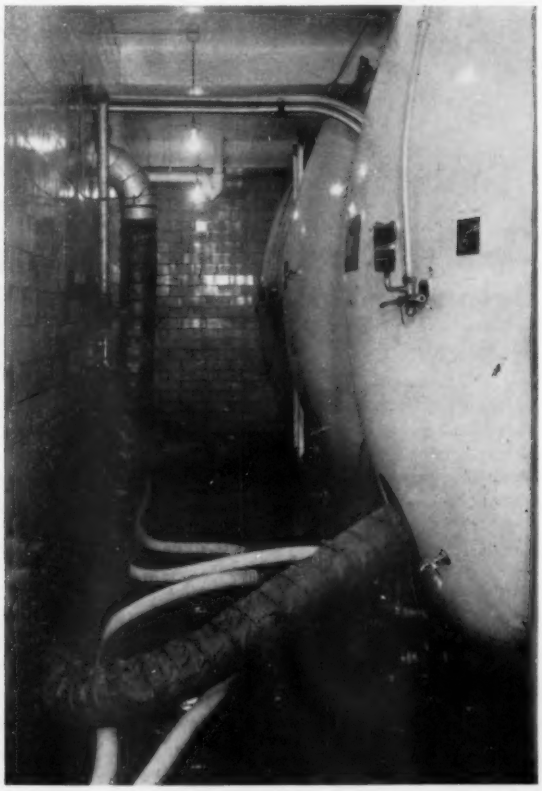


Fig. 4. Carbon dioxide fumes are exhausted from bottling tanks, in less than one hour, preventing production delay

Fig. 1. Tools used in truck maintenance are kept available and in good condition

3-Point Maintenance Plan for Trucks

Baltimore Housing Authority Evolves Do-It-Yourself Plan

By ERNEST M. STOLBERG, Mech. Supt., Housing Authority of Baltimore City, Md.

THE HOUSING AUTHORITY of Baltimore City has a fleet of 31 trucks of various styles, makes, and ages. These trucks are in daily use to serve the transportation, materials-handling, and repair needs of our 15 public housing projects located in several areas of the city.

Until we set up our own truck maintenance and repair program four years ago, our costs were high and availability of equipment was low, especially in cold weather. In addition, our automotive equipment made a poor public appearance, which was most undesirable for a public agency. The complete reverse is now true.

Over the past four years, we have evolved a program that has proven effective and meets our needs quite well. It consists of three main features.

First, a complete lubrication-inspection job three times per year, done by a competent automotive mechanic at approximately the following periods: September-October, February-April, and July-August. These periods correspond to the times when, because of outdoor climatic conditions, wear is greatest on the mechanical parts of a truck, tractor, or air compressor.

Experience Important

We use an experienced truck mechanic to do our own lubrication for several reasons: firstly, he can discover and correct defects while they are still relatively minor and inexpensive in nature; secondly, since we schedule our trucks for lubrication, we do not lose the services of the truck and driver for several hours while they are waiting their turn in line; thirdly, we know all fittings have been properly lubricated with the best and most suitable lubricant its particular service requires.

We use two types of inspection forms. The short form is filled out monthly by the truck driver himself and gives him a chance to show the personal initiative necessary to keep his particular truck in tiptop shape and to point out defects to us as they arise. The long and detailed form is kept at the shop and is used as part

of the shop records to maintain a machinery history of all our automotive equipment and to indicate to our shop superintendent what to expect in the future.

Second feature of our program is major overhaul. When our lubrication inspection, our machinery history records, or the cussedness that seems to haunt even the best of maintenance people occasionally, requires that a major overhaul be done on a truck, tractor, or air compressor, we try to select a time that will involve the least loss of availability of material and inconvenience to all parties concerned.

No Rush Jobs

This is sometimes possible by rescheduling our available trucks or by deferring certain of our truck movements, etc. Time is a very important element. We know that most rush jobs are incompletely or poorly done and will wind up in our shop again, sooner than necessary, at a loss of additional time and money. Therefore, we insist upon the time it takes to do a decent job without our nagging the men. Conscientious and capable men will go all out themselves when occasion demands without anyone cracking the whip.

Occasionally, time is required to get certain parts. In this connection, experience in the field is invaluable since it establishes certain connections and sources of supply which are often not even available to your purchasing agent. We try to plan the purchase of these parts in advance of a job, but generally, it is impossible to determine all one's requirements for replacement on a major overhaul until the equipment has been disassembled and carefully inspected.

Third point requires that twice a year, in May and September, we look to the external appearance of our equipment. Since we do not have adequate indoor paint-spraying equipment, we must choose those times when outdoor conditions are most nearly right for spray-painting and body and fender work. During these periods, we inspect all vehicles and schedule those for painting whose appearance is below par.

Thorough Preparation

Any complete paint job involves, first, a thorough washing to remove external dust and dirt; rust- and scale-removal by wire-brushing, machine-sanding the broad areas and chipping the hard-to-get-to places; degreasing with steam-cleaning equipment, if available, or with detergent and sponge; and finally, in bad cases, removal of oxidized paint film with chemical paint removers just prior to covering all areas which are not to be painted with paper and masking tape. The final steps are, of course, priming with a good rust preventive film and the application of a hard finish-coat of enamel or lacquer.

Fig. 2. Hydraulic jack and pneumatic greasing equipment is used for lubrication

Fig. 3. Truck wheel is replaced quickly and easily with an electric stud driver

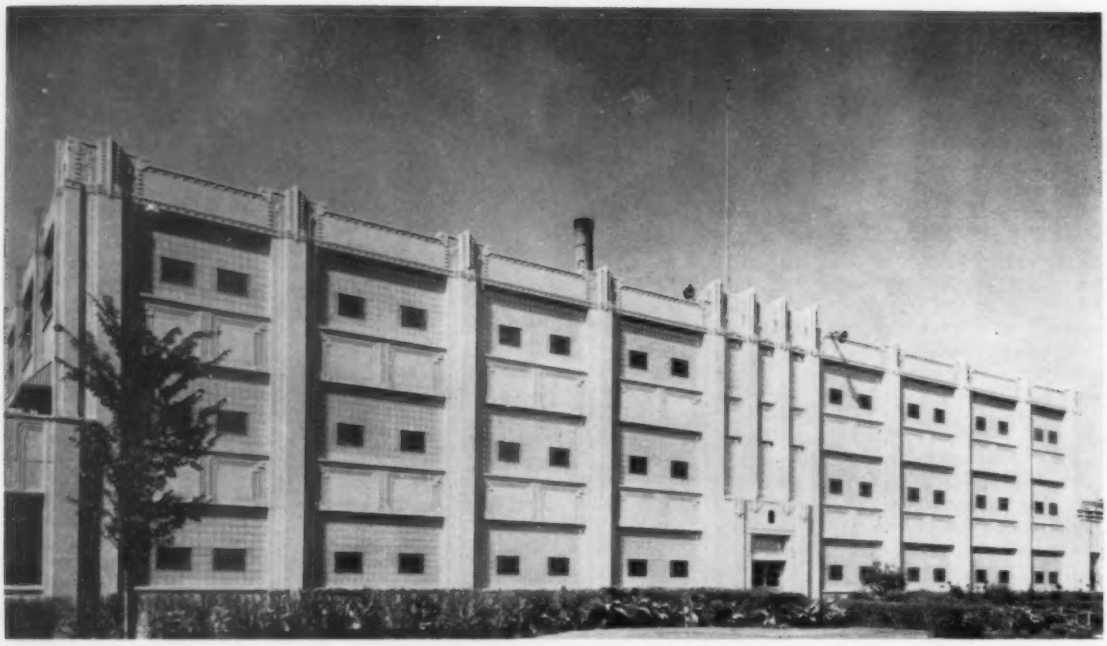
We find that, other things being equal, our drivers tend to take increased pride in their equipment when it looks good, and this pride is generally reflected in the care they give their truck or tractor.

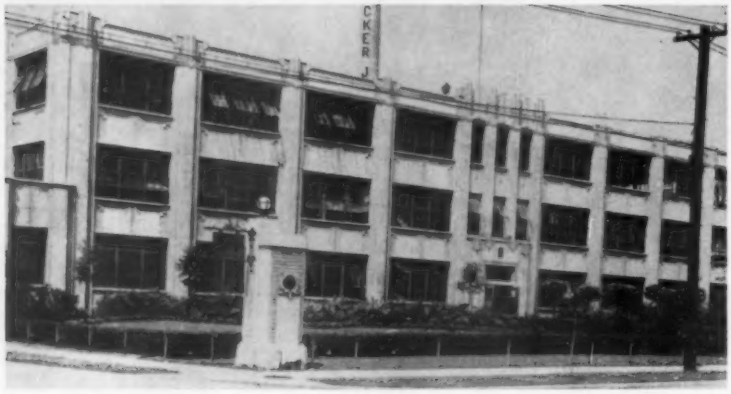
The methods described, initially had to be practiced in a rather crowded storage garage without proper lighting or heating facilities and with limited equipment. Since then, our shop superintendent has rearranged the location of garage entrance doors; installed his own shopmade heating system; installed effective lighting; and, with cooperation of the supervisors, William F. Knop, General Maintenance Superintendent, and David L. Maulsby, Assistant Director of Management, has provided the necessary tools and equipment.

Minimum tools required for this kind of automotive maintenance include: 1. inspection and test equipment; 2. repair equipment; 3. lubrication equipment; and 4. paint spray equipment.

It should be noted that all equipment is carefully labeled and can be considered a minimum to adequately handle this kind of duty.

The fundamental necessities of successful automotive equipment maintenance, when confronted with a small budget, are: 1. Experience and effective leadership at the shop level; 2. experienced and intelligent long-term planning at higher levels, 3. experienced, skilful, and intelligent shop mechanics, 4. a spirit of genuine cooperation among all of these, and 5. a willingness on the part of top management to take a calculated risk.





AFTER **Above: Eye-pleasing exterior of Cracker Jack plant is visible evidence of installation of glass block walls. Ventilation and heating improvements inside building provide economic basis for making installation to replace worn metal sash**

BEFORE **Left: Prior to glass block installation, plant had extensive areas in steel sash. Dust and dirt infiltration, undesirable in a food plant, when coupled with employee comfort measures, instigated investigation of glass block walls for plant**

Face-Lifting With Glass Block

Masonry of Glass Installed in Food Plant Window Openings

EXTERIOR WALL modernization at Cracker Jack Company's Chicago plant has solved many problems of dirt and dust conditions, high glazing maintenance costs and temperature and humidity control.

More than half the steel sash windows in the three-story building have been replaced with daylight- and temperature-controlling glass block curtain walls in the last few years. D. F. Vater, plant engineer for the company, contrasts the former high costs of welding, puttying and repairing the old steel sash windows with the negligible maintenance required for the glass block walls. Annual cost of maintaining the windows had amounted to about $150.00 an opening, with two men spending almost full time greasing hinges, cleaning panes and fixing the windows.

The problem was particularly acute in second-floor offices and production areas along the front of the building, facing east. Here, morning and noon sun blazed through large window openings, increasing room temperatures high above the comfort level. Heat buildup in the stairwell was so severe that employees could not touch the stainless steel handrail, while descending the stairs.

During the winter, with the opposite extreme in temperature, the employee comfort problem existed in another form, when drafts off the window surfaces brought on complaints.

To solve these problems, every window opening in the front of the building was modernized with panels of glass blocks. Each Suntrol block, produced by Pittsburgh Corning Corporation, contains a pale green fibrous glass diffusing screen, reducing the intensity of heat and glare.

In the front wall, there are 24 panels of blocks, each panel 18 ft wide and slightly more than five feet high. In each panel, two stainless steel sash ventilating windows are installed.

One of the principal benefits of the glass block installation has been the elimination of dust and dirt—which in a food processing plant like Cracker Jack's, receives highest priority. Dust and dirt infiltration has been cut to a

minimum, since none can filter through the glass block walls.

Exterior wall openings for all important manufacturing and packaging areas in the plant are now protected by the glass block panels. As an added benefit, the neat appearance of the glass block installation improves the "consumer attitude" of the people who daily view the plant, in its location on a heavily-travelled Chicago street.

and in power plant walls, too . . . .

RUSTED-OUT METAL sash and continuing maintenance costs prompted the Oliver Corporation, South Bend, Indiana, to modernize an entire wall of the building housing its boiler room and heat treating department. Replacing the metal sash windows with 12-in. square glass blocks improved natural illumination in the work area, and reduced substantially the winter heat losses and summer heat gains in the building.

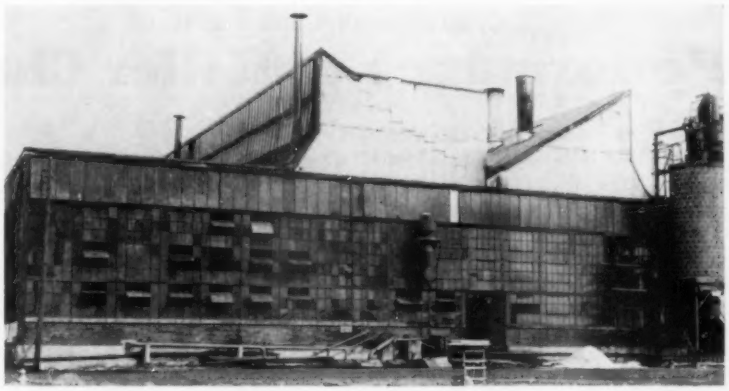
Cost of installing more than 3000 Suntrol blocks in the 132-ft long, 27-ft high wall was approximately $2000.00 more than it would have cost to install new metal sash. However, according to Cal Austin, maintenance superintendent at Oliver, the freedom from maintenance, the controlled lighting and the high insulating value provided by the blocks far exceed the additional original cost.

One reason that the old sash required so much maintenance, in addition to its exposure to outside weather, was the condensation of moisture on the metal surfaces. High temperature and humidity in the area caused sweating on the windows during the winter. And, acid bath fumes constituted an additional problem—corrosion.

The blocks were installed a section at a time to prevent interference with operations in each area of the building. A little more than a month was required to complete the entire job, which included rebuilding the five-foot masonry wall under the window.

Glass blocks in this installation were set in place with waterproof mortar between framing built of four-inch steel channels with intermediate stiffener supports of steel sheet. Each main panel, between the four-inch channel frame, contains 77 blocks, which are caulked in the channel. All exposed surfaces of the steel framework were covered with aluminum sheeting, the edges of which were crimped over the steel. Ventilation openings, 42 in all, are aluminum sash, each three feet long and two feet wide.

BEFORE **Right: Glass and steel sash wall of Oliver plant, in areas of boiler room and heat treating operations. When replacement was necessary, consideration was given to glass block walls to minimize maintenance costs, reduce heat transmittal**



AFTER **Below: With 42 aluminum sash providing "view" to outside, entire wall of building has been rebuilt with glass blocks. Aluminum sheeting was used to cover all exposed steel framing members. Light-diffusing blocks cut glare**

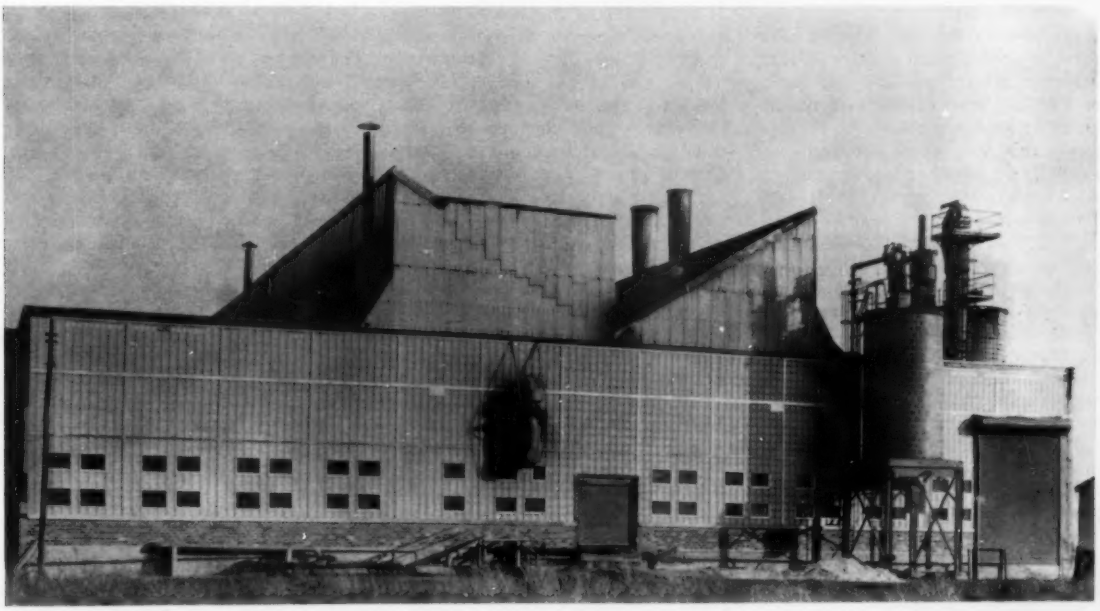


Fig. 1. Sixty horsepower dynamometer unit used in series of tests on sprocket eccentricity and chain pitch variations

Analytical Techniques Can Predict

Performance of Roller Chain Drives

By WM. F. HOFMEISTER, Chief Metallurgist and
HERMAN KLAUCKE, Chief Engineer, Roller Chain Div., both Chain Belt Co., Milwaukee, Wis.

INTERNAL FLEXIBILITY of a roller chain, which makes chain an ideal means of transmitting power in many applications, serves also to obscure the ailments that may beset an improperly constructed or maintained drive.

Whereas other means of transmitting power will set up a howl or clatter and give audible evidence of mismated parts within the system, a chain drive will suffer in relative silence, but as in other types of power trains, it will also give reduced service life under these conditions.

The relatively recent introduction of strain gage transducers has provided a tool for investigating the dynamic operating performance of chain drives. This article discusses the application of these techniques in analyzing the performance of a drive, and points out practices to avoid in the maintenance of chain drives in order to obtain maximum chain life.

There are three sources of load pulsations introduced in any power train, namely:

1. Power pulses introduced by the prime mover
2. Demand variations in the driven load
3. Load variations set up within the transmission system itself due to its inherent characteristics or to dimensional differences from part to part within manufacturing tolerances.

The first item is the concern of the engine manufacturers. Item two can be minimized by proper design and operation of the machinery. The third item is of prime importance both to the chain manufacturers and to maintenance staffs, for improper mating of components of the drive can greatly reduce the life of the drive from within itself.

There are three sources of chain tension variations introduced within a chain drive. One, which has been given considerable attention in the past, is chordal action. This results from the fact that a sprocket is a finite polygon rather than a true circle. The tangential velocity of the chain varies from a minimum when the round parts of the link are just seating to a maximum when they are farthest out on the pitch circle. The effects of chordal action on tangential chain tension are most severe on sprockets with small numbers of teeth but become greatly reduced on sprockets having more than 20 teeth.

The second source of chain tension variations results from eccentricity between the bore of the sprocket and the pitch circle, or from a bent shaft. This factor can cause large variations in chain tension to be superimposed on those caused by the prime mover and working load. These tension fluctuations result in peak tensions being imposed on the chain and associated machinery, well in excess of the tension calculated on the basis of the horsepower available.

Thus it is possible for a chain to be overloaded 100 per cent while operating on a drive properly calculated with respect to horsepower requirements, but having sprockets manufactured outside ASA tolerances. The oscillograph records of dynamic chain loading described later show why sprockets must be manufactured with precision equal to that used in the manufacture of the chain itself. Although less frequently encountered, a bent shaft can produce the same harmful results.

The third source of internal chain tension variations is caused by nonuniform pitch over relatively long sections of chain, i. e., the length of the chain between sprockets. For example, if the center distance is two feet, then each two-foot progression of pitches must be the same total length or chain tension variations will result.

Figure 1 shows a portion of the General Electric 60-hp dynamometer used in making the dynamic load measurements. This particular setup is one used in a series of tests in which

the effects of both sprocket eccentricity and chain pitch variations were studied. Eccentricity was varied by means of an adjustable eccentric bore on a plate sprocket.

Chain tension was measured by means of a strain gage torque bridge located on the shaft. Gage leads were passed through a small hole in the center of the shaft and connected to a Baldwin slip ring. A Hathaway control unit and oscillograph were used to record the signals. The torque shaft was calibrated statically by locking one of the dynamo rotors and applying a torque on the opposite dynamo rotor while measuring chain tension using a strain gage load cell connected directly into the chain strand. Frequency response of the galvanometers used was 1,200 cycles per second and the accuracy of measurement was of the order of ±2 per cent.

Test Results

Figure 2 shows a typical oscillogram obtained in a test using one-inch pitch chain and 19-tooth sprockets on 33¼-in. centers. The record shows a large load variation which repeats for each travel of a given link once around the chain circuit (chain cycle). This fluctuation is the result of non-uniform pitch. The pitch variation was introduced by coupling the chains of six different chain manufacturers. The pitch of each section was uniform within itself; however, present ASA specifications allow a variation in chain length of 1/64 in. per foot of chain or 0.13 per cent.

On most drives a chain will give satisfactory performance up to about 3 per cent elongation, a limit determined by fit of the chain on the sprocket. Considering the load variations introduced by as little as 0.13 per cent difference, it is clear why it is poor practice to couple a section of new chain into a worn chain strand.

Replacing damaged links individually does not cause this harmful load variation because the percentage change in length introduced by this single link while in the tight strand is too small.

In order to determine whether the low frequency, large magnitude load variation observed on the oscillogram was actually caused by pitch variations, the pitch of each link in the entire strand was measured. Measurements were made from roller to roller with a special gage accurate to 0.0001 in. The length of each successive 33¼ pitches was obtained by summing the measured link pitches. These data are plotted directly on the oscillogram (broken line in Fig. 2).

(Continued on page 222)

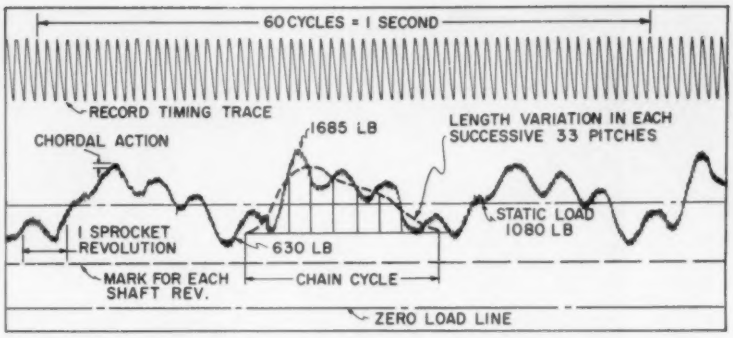


Fig. 2. Result of test on composite, one-inch pitch chain, 19-tooth sprockets

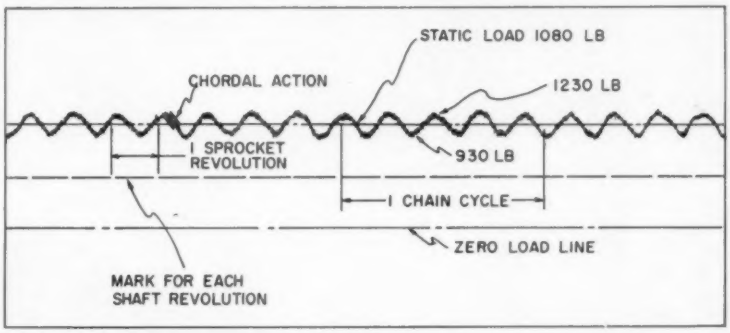


Fig. 3. Test chain used was similar to that in first test, but from one supplier

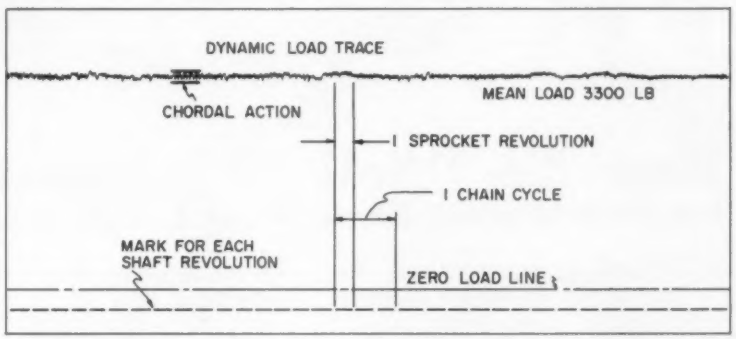


Fig. 4. 1½-in. pitch chain, run on 24-tooth sprockets at 900 rpm, met ARSCM specs

Table I. Data shows reduction in life when new and worn links are coupled

60 hp Electric Dynamometer
One-Inch Pitch Chain, 19T Sprockets, 33¼-In. Centers, 824 rpm

	Composite Chain		Homogeneous Chain	
	Lb	Per cent of Mean	Lb	Per cent of Mean
Mean tension	1,130	100	1,080	100
Maximum tension	1,685	148	1,230	114
Minimum tension	630	55	930	86
Maximum tension variation	1,055	93	300	28
Variation due to non-uniform pitch	700	62	0	0
Variation due to sprocket eccentricity	270	24	270	25
Variation due to chordal action	60	5.3	60	5.5
Mean transmitted horsepower	45	100	43	100
Peak transmitted horsepower	67	148	49	114

Fig. 1. Plant Engineer Burke Wombacher has wide source of data available in trade publications, books and papers, to help put across well-planned preventive maintenance program to management

How To "Sell" Maintenance

Let Management Know What It Gets from Program

By BURKE W. WOMBACHER, Plant Engineer, Appliance Controls Div., Minneapolis Honeywell Regulator Co., Gardena, Calif.

SUCCESSFUL PLANT ENGINEERS I know are also successful and subtle salesmen...men who might be million-dollar-a-year policy writers were they selling insurance.

For, in many respects, selling your management on maintenance requires all the persuasiveness of an insurance agent. The similarity of "product" is closer than many realize: both plant engineer and insurance man deal in intangibles.

"But *selling,*" you're saying, "has nothing to do with that new lubricating program I've been planning...and even less to do with the productive maintenance program now on my drawing board."

Don't you believe it. Selling has *everything* to do with putting those plans of yours into action, and practice. But, if *selling* is a word which irritates the engineering senses—as it sometimes does—then call it "communications." Whether you call it selling or communications, the truism holds: no really big maintenance program gets the executive nod today without a calculated, careful campaign of persuasion on the part of the plant engineer.

Looking back now, after 22 years in plant maintenance, I realize what a poor salesman I was for a good many years. Like a lot of other plant engineers, I spent a decade learning the fundamentals of selling management on maintenance.

The fundamentals? There are really but two basic premises: (1) management, by nature and training, is production-minded . . . accustomed to dealing in tangibles; (2) the plant engineer must be a salesman, if he's to sell a tangibles-minded management on so intangible a thing as a full-scale maintenance program.

I remember my first attempt, a long while ago, to sell management on such a maintenance program. They didn't buy it. I felt defeated. And I blamed management for their stupidity...for not recognizing the savings I was offering.

It had been my pet project. I believed in it, had worked long hours formulating it. But management hadn't "bought." Why? Now I know why they didn't: I failed to sell them. I had a product I believed in. It didn't seem necessary to sell management on a plan which would increase machine life, keep production moving steadily on schedule.

I was so absorbed in the mechanics of the program that I naively believed

Fig. 2. Maintenance program on drawing board must be "sold" to management

my program would sell itself. It didn't. Not many maintenance programs are self-selling, anymore than is a new dentifrice. Somebody may believe in the product. It may be fundamentally good for the user—the consumer. But its true worth is almost never recognized without selling. It's the same with the best maintenance program ever devised...or likely to be formulated in the future.

After that first defeat—it wasn't at Minneapolis-Honeywell, but at another company—I took stock of *myself*. I adjusted my thinking. I tried, for the first time, to look at maintenance from management's viewpoint.

That "look" was an eye-opener. Gradually, I came to understand why management is traditionally hard to sell on any really extensive, full-scale maintenance program. I spent hours analyzing management's concept toward maintenance, as any seller must analyze his potential buyer. And here's what I found:

(1) Management may be both uncertain and disinterested about the necessity for maintenance beyond a basic "fix-it" program. For inherently, management, as mentioned above, is production-minded. It turns violently cost- and savings-minded when confronted with an indirect expense—like a full-scale productive maintenance program. The reaction is both natural and inbred, a reflex responsive to thinking in terms of production. An inborn urge to reduce wherever possible the indirect expenses involved in production.

(2) Management—at least in earlier years—tended to consider maintenance a necessary evil, even to begrudge the cost of supporting a fix-it crew. "Maintenance" in some plants became suspect...as meddlers forever interrupting production schedules by interfering with machines in the name of preventive maintenance. Management's thinking hewed to a monetary theme "let's turn out a product...and now." Maintenance's thinking was contrary to the "production now" concept. Maintenance trended to the premise that a brief shut-down might save future production stoppages. But "future" was an intangible. Management was better attuned to understanding that tangible "now"—a product coming off a machine today.

(3) Management isn't often persuaded by a "spend money to save money" program, unless it's delicately and deftly "sold". For tangible-minded production men, that "spend money to have money" approach has a hollow ring...when applied to maintenance. It's a sales catch-phrase that is needed to entice production men when, let us say, it involves buying a carload of steel at resultant quantity-price savings. That's tangible. Promises of future production aren't.

Selling the Intangible

(4) Management's first inclination, when operating margins are slim—or the competitive position of a product narrow—is to cut down on the indirect expenses of production. And maintenance is among the costliest of these indirect expenses. The natural tendency in such situations: to pare the maintenance payroll, reduce the programming to simple, basic essentials...to revert to a fix-it program.

(5) Management, in many cases, considers maintenance a logical first target in its efforts to reduce costs. This seems illogical, certainly, to the plant engineer nursing a good maintenance program...one he deeply believes in. But management views such a program as an indirect expense... and "indirect" with many a production-minded management is an expensive word.

(6) Management, in the same vein, takes the stand that all costs become the costs of the finished product, that the greater the reduction of costs, the better a product's competitive position. This is why a full-maintenance program, in many a plant, never gets further than the drawing board.

(7) Management is commonly hard-headed, practical and not interested in buying intangibles. You may think you can "prove" savings. And you may promise them. But "proven" savings come only over the long pull. Only after you have successfully installed and put your program into practice. What you promise during the selling, looks, too often, like an intangible.

All right, this then is management's outlook...as management views your program and mine. It would seem that the selling is all but impossible. That's not true. Hundreds of plants across

the nation have full-scale preventive-maintenance programs. Yet each has had to be sold... and in every case, the seller was a plant engineer who, backed by know-how and engineering, turned salesman. He sold maintenance as if it were a commodity.

How to sell a maintenance program:

(1) Recognize that what you have to sell is an intangible that cannot be seen, touched, tasted, smelled or otherwise concretely conceived or measured for value.

(2) Do not try a crash program with a fast sales pitch. Never try selling your program at a single meeting. Management men aren't easily fast-talked. They become suspicious at any attempt to high pressure the sale of an intangible.

(3) Recognize that selling a maintenance program is basically a problem of idea communications—and that it must be subtly sold.

(4) Plan a slow, careful, calculated campaign to sell by means of the psychology of idea communications suited to your knowledge of *your own management's behavior pattern.*

Essentially, for plant engineers engaged in a "program sales" campaign, there are four basic laws:

Law of Primacy. The first time an idea or plan is discussed—even though its name be only mentioned—makes an indelible impression upon the mind.

Law of Recency. The last thing heard leaves the most vivid impression on the mind.

Law of Frequency. Repetition makes its impression through the cumulative effect upon the mind.

Law of Appeal to Emotions. The mind responds best to ideas that serve to inflate ego, satisfy personal desire or suit a person's sense of logic or reasoning.

How do you go about applying these laws of communications in your maintenance-sales campaign?

Let's consider the Law of Primacy ...the first time you mention to management your maintenance program. Wait for an appropriate time, a staff meeting, for example. Assembled are all of the management men concerned. That's the time to plant briefly (as early in the meeting as possible), your program. The "planting" must be brief. You might say, "There would probably be significant savings from a good maintenance program...something that goes beyond our present program. Perhaps we should look into this."

At meeting's end, apply the Law of Recency...get in the last word. Suggest perhaps, "I'll look into this maintenance savings angle for you."

All right, you've planted the idea; you hew the Law of Frequency. Keep management exposed to the subject of maintenance. Plant engineers have at their fingertips wide reference data... detailed analysis through trade publications of what other maintenance programs are doing for other plants... books and articles written by maintenance experts...reports by manufacturers. Feed these data to management men. These, better than words, help put over your case.

Nor to be overlooked is the Law of Appeal to Emotions. You've got to realize that even the educated mind balks at working hard at something which only marginally interests it. Sales — whether soap, toothpaste or maintenance programs—are best sold by subtly serving up truisms.

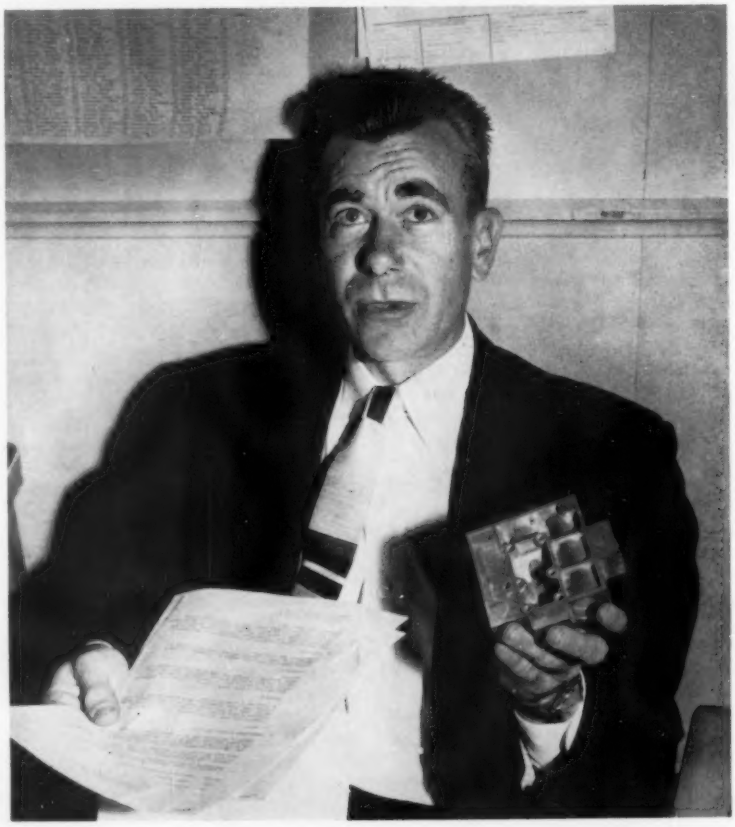
At one management meeting, you might say, "Keep your plant up and keep costs down." Or maybe, "Workers and foremen waste time that should be productive by making repairs that should be done by maintenance...as part of an integrated program." Or, "There's no sense in buying expensive, high-production machines unless you have good maintenance to keep them running." Or again, "Skill is more and more being built into machines rather than into operators. And maintenance—a full maintenance program—is needed to keep our higher-productive machines efficient." Or maybe, "Breakdowns which stop production on automatic machines destroy the cost advantage of buying the machine tool in the first place...so preventive maintenance is a must."

Only when you are convinced that you have management properly conditioned is it time to do any aggressive selling. Be satisfied at first to get their approval for only a partial program—perhaps a new lubrication set-up. Use this to build up a set of records, concrete facts that'll help make your continued selling easier. For remember: you've got to keep management sold and enthusiastic.

As your maintenance selling program develops—as management agrees to initiate more and more of your overall program—you'll likely need more men and equipment. But don't make the mistake of telling management "this is what *we need.*" Always it's "this is what *you get.*"

It's ironical, perhaps, but such a sales technique wasn't necessary here at Minneapolis-Honeywell, whose management has long been both cognizant of and sympathetic to maintenance's "big picture".

Fig. 3. It's one thing to "sell" new design part, another to "sell" a plan



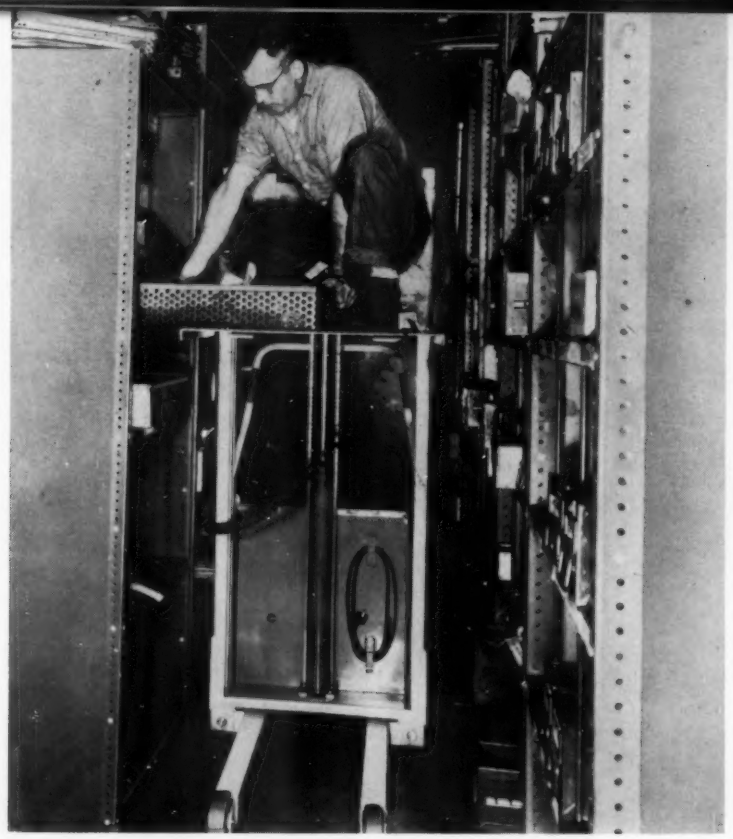


Fig. 1. Stock picker can elevate himself on portable lift to reach high shelves

Portable Lifts Can Be Useful Materials Handling Aids

By JAMES C. DANGLER, Mgr., Materials Handling Div., Oster Mfg. Co., Cleveland, Ohio

OFTEN OVERLOOKED in planning a materials handling system is the use of equipment which provides for mechanized raising and lowering of loads through the economy of non-powered, horizontal transportation.

This type of materials handling equipment includes portable lifts, hand stacking trucks, portable elevators, and the like. Some models are designed to serve in various capacities with the use of interchangeable load carriers, change of leg position, etc. All such equipment will here be referred to as portable lifts.

Portable lifts are not intended to compete with either riding type or hand-guided motorized type industrial trucks. Rather, they are designed to supplement the use of such equipment, or to be applied where they are more economical in use, such as for occasional jobs, especially those involving short moves, or in one department only, on an intermittent basis where both lift and travel are required.

Raising and lowering of portable lifts is accomplished by battery-, constant duty motor- or hand-operated hydraulic systems. Where light loads are handled on an infrequent basis, hand operated lifts are most practical. Where lifts are frequent, or where even occasional lifts are heavy, battery-powered lifting mechanisms are usually prescribed. Where lifts are almost continuous, at a machine or work station for example, lifts powered by constant duty motors are necessary.

Portable lifts can be equipped with various types of attachments to increase their versatility to a specific job or to a number of jobs within a plant. Such attachments include barrel grabs and dumpers, drum grabs, rams, roller tables, and many others.

Where floor load capacities are limited, on upper floors in a multi-story building, in elevators, in rail cars or trucks, portable lifts may be used to advantage. Because of their short turning radius, such equipment can be used in narrow aisles, in crowded production areas or in common carriers. They can also be used in stacking operations or for picking up palletized loads from powered trucks, at the entrance to storage areas, for stacking.

During receiving and shipping operations, a single operator utilizing a portable lift can raise or lower loads from the bed of a highway truck, transfer them to and from the plant to eliminate peak load bottlenecks at the shipping dock.

Where no docks are available, or where adequate space does not exist in busy receiving or shipping periods, portable lifts are used for convenient transfer of the loads.

Examples of Their Versatility

A small Ohio tool and die shop, because of a lack of truck docks, utilizes portable lifts to transfer loads from incoming trucks direct to storage in the plant. The reverse is true for shipping.

Inside the plant, portable lifts are widely used for handling materials at machines and other work stations. Since it is uneconomical to tie up more costly industrial trucks to serve as work positioners at such areas, portable lifts can serve in the triple capacity of delivering loads to work stations, elevating them to convenient operator working height, then positioning the work as it is removed piece by piece during the normal work cycle.

The same tool and die shop also employs portable lifts to transport 6-in. diam bar stock, ranging in length from 6 ft to 8 ft, from storage to a metal cutting band saw. At this work station, the lift doubles as a work positioner while the required length of stock is cut off.

In many plants, jib cranes are located at machines to position loads and fixtures. Portable lifts can likewise be used for such jobs. They are often employed for transferring loads between bays served by overhead bridge cranes, and where these are not immediately available during peak work loads, portable lifts can be put into service, saving time.

Apart from production operations, lifts can aid in machine set-up work and other maintenance jobs. Fitted with platforms, they can be used for a variety of overhead maintenance jobs or for holding work at proper height for repair, for cleaning and adjustment. Thus, in addition to raising and lowering loads, they can also serve as work platforms. Remote control of the lifting and lowering mechanism allows the operator to accurately control the lift, yet ride to the point of work.

(Continued on page 222)

Fig. 1. W. M. Hickan, research scientist, gives electric arc a "hypodermic shot." Injection of sulphur hexafluoride gas quenches arc by "soaking up" electrons

Fig. 2. Lead on the hot plate is molten, and the conventional insulating resin (right) smolders, but the solventless silicone resin (at left) remains intact

Westinghouse

LOCATED ON A 72-acre site in Churchill Borough, 10 miles east of downtown Pittsburgh, is the new home of the Westinghouse Research Laboratories.

It is a three-story, L-shaped building, containing 313,000 sq ft of gross floor area and housing laboratories, offices, maintenance shops, cafeteria and other requirements for a staff of more than 700 people.

Included in these facilities are a complete metals processing laboratory for melting, annealing, rolling metals and alloys; an instruments laboratory; several machine shops; a glass blowing laboratory; a photographic and reproduction department; drafting facilities, and other services necessary to the functioning of a modern research organization.

Keynote of the building's interior is flexibility, which is accomplished by a modular system of construction for laboratory and office space. Each module measures six feet along the window wall and either 19 or 25 ft in depth. This is the smallest repetitive unit of space that is completely equipped with laboratory and building services.

These modules, separated by movable steel partitions, can be combined into standard laboratories of 12, 18, 24 or more feet in width, all with a ceiling height of 10 ft, four inches under the beam. Service facilities supplied to each module include hot and cold water, drains, compressed air, vacuum, natural gas, oxygen, hydrogen, nitrogen, 216-volt, single- and three-phase electricity, 60-cycle a-c; 125-volt, single-phase, 60-cycle a-c; and 110- and 220-volt d-c.

Work in the laboratories is organized into 11 departments. These include chemistry, electromechanics, electronics and nuclear physics, insulation, magnetics and solid state physics, mathematics, mechanics, metallurgy, physics, semi-conductor and solid state physics, and technology.

Only 10 per cent of the new laboratory is devoted to applied research—work of a practical nature focused on a single product. Fifty per cent is on basic research—the search for new knowledge in fields which relate directly to Westinghouse. Forty per cent, is devoted to fundamental research—work in fields of science basic to the electrical industry, but not directed toward a particular product development.

Here are just a few examples of the many projects that are going on at these new laboratories. One group of scientists at the laboratory have found a new way to quench an electric arc. To do this, they use a gas which literally "soaks up" the arc's electrons in much the same manner as a sponge soaks up water. One gas currently under investigation is sulfur hexafluoride. It may be the answer to better circuit breakers in the future.

A new, high-temperature, high-voltage insulating material developed jointly by Westinghouse and Dow Corning Corp. can be formed into thick sections of solid, heat-resistant insulation for use in complex electrical equipment. This new insulation is a solventless silicone resin. By eliminating the solvent, the insulation is entirely free of air spaces, or "bubbles." It may prove helpful in reducing the weight of transformers.

In another development, steam under a pressure of 16,000 psi and at a temperature of 1200 F is being used to test the strength of a stainless steel casing which will "house" the super-pressure element of a new turbine.

The turbine and the electric generator it drives will constitute a turbo-generator unit rated at 325,000 kw—enough electric power to supply all the residential needs of a city of about one million people.

This new unit will operate with a steam pressure of 5000 psi—about

Fig. 3. J. H. Bechtold, manager of the metallurgy department, demonstrates how Inconel-clad molybdenum withstands high heat, while molybdenum or Inconel alone each fail. Sample 1 is Inconel; sample 2 is molybdenum; sample 3 is Inconel-clad molybdenum, to take advantage of the best properties of each

Fig. 4. Inside this tank-like electric furnace, steam at 1200 F and 16,000 psi, is being used to test strength of a stainless steel casing for a new turbine

Research Labs Look Beyond Tomorrow

twice the pressure of any present-day turbine. The temperature will be 1200 F.

In another laboratory, scientists are trying to find out the "why" of superconductivity—that strange behavior of certain metals, in which, at low temperature, electric currents apparently flow forever.

In this experiment, super-frequency waves are used to "bombard" a superconducting metal such as aluminum or tin that is held at a temperature less than one degree above absolute zero. The waves are absorbed by the metal, which "soaks up" enough energy to lift its electrons from the superconducting to normal conducting state.

In some of the other laboratories, scientists are testing a new combination of high-temperature alloys that may increase the efficiency of jet engines more than 15 per cent. The development involves the "sandwiching" of one high temperature alloy, in this case, Inconel, around another, molybdenum, to take advantage of the heat resisting qualities of each.

Electroluminescence, the giving off of light by phosphors coated on a glass panel that is treated to conduct electricity, is another field that is receiving a lot of attention at the laboratory.

In the electronics and nuclear physics department, the staff is working on a new principle for a television camera pickup tube which will "see in the dark." The tube gives promise of being 100 times more sensitive than present day television camera tubes. Possible uses might include color television, closed circuit telecasts such as inside manufacturing plants where lighting is limited, and virtually any indoor or outdoor event regardless of the time of day or weather conditions.

Other experiments include the electronic brain which has a built-in intelligence, enabling it to distinguish between right and wrong decisions. It may prove helpful in controlling complex industrial processes.

Scientists at the laboratory have also developed a new type gyroscope, based on the principle of a vibrating mass instead of a rotating mass.

Fig. 5. View of the new Research Laboratories. Modular construction for laboratory and office space, plus the use of movable partitions, offers flexibility

Batteries Punch a Time Clock

Complete Battery Service Record Is Kept on Timecards

TIMECARDS ARE being used by the Peshtigo Court plant of Kraft Foods Co., Chicago, Illinois, to keep service records on industrial storage batteries.

A record card, Fig. 1, for each battery is kept in a rack near a time clock. As the batteries are brought in to be charged, the card is stamped in the time clock and the specific gravity is recorded. In addition, the circuit on which the battery is charged is noted and the number of the pilot cell checked is recorded.

The card is punched out at the end of the charge and the specific gravity again noted. With this information on record, over a period of time, a deficient battery can be detected early enough to apply corrective measures. A malfunctioning charging circuit can also be brought to light quickly.

The pertinent details from the timecard of each battery are recorded on permanent cards which are kept in a master book. These are reviewed periodically to determine battery performance, general charging efficiency and future battery life.

This timecard system is used to keep records on 45 12-cell batteries, used for 23 rider-type lift trucks, and 40 6-cell batteries, which power 18 hand trucks.

Battery charging is done on the fourth floor of the nine-story building in two adjacent areas separated by an aisle. The battery shop is close to the electrical shop, and all battery charging and maintenance come under the electrical foreman.

In the battery room there are a total of 34 circuits: three 5-circuit; four 4-circuit; one 2-circuit; and one 1-circuit chargers. All charging is done by time voltage relay control, which is automatic once the batteries are connected to the circuit.

Batteries are cleaned with water, soda and a brush periodically. Water lost through evaporation is replaced with distilled water. A portable rig, Fig. 3, was developed at the plant. The unit holds water, hydrometer, cell filler and other tools.

While battery charging is centralized, battery changing is done on the first floor where most of the trucks operate. Charged batteries are brought in on skids from the charging rooms, via powerized hand truck and elevator, to service area on first floor.

CD-1554 2/58 NUMBER

BATTERY RECORD 1

ELECTRIC SHOP -- PESHTIGO COURT

TIME IN/OUT	SP. GR.	CELL NO.	CIR. NO.	REMARKS
JUL 9 8 22	1170	4	10	
JUL 10 8 19	1255			
JUL 11 8 17	1200	5	25	
JUL 12 8 14	1280			
JUL 14 8 33	1185	6	21	
JUL 14 5 08	1270			BOOSTER CHARGE 12.75
JUL 16 8 20	1140	7	25	
JUL 17 8 31	1155	V8		
JUL 18 8 46	1168	9	15	
JUL 19 8 26	1140			
JUL 21 8 25	1140	10	16	
JUL 21 8 23	1260 1270			
JUL 23 8 26	1150	11	19	
JUL 24 5 48	1270			

Fig. 1. This card keeps battery maintenance record. The times in and out are stamped in the time clock. Specific gravity, number of charging circuit and the cell number checked are noted

Illustrations: Gould-National Batteries, Inc.

Fig. 2. Frank Tosi, electrical foreman, conceived the idea of using a standard time clock and timecards to keep accurate maintenance records on each industrial battery in the plant

Fig. 3. Portable table, right, contains distilled water, hydrometer, cell filler and other tools. It was devised at the plant for flushing the batteries and taking gravity readings

Fig. 1. Instructor Cesarz conducts class in industrial electronics. Course was designed to familiarize Chrysler employees with the mechanics of electronics. Lectures, visual aids and workshop sessions play a part in teaching course

Electronics Training at Chrysler

Electricians Learn More About Servicing Plant Equipment

WITH MORE AND MORE electronic equipment controlling the operations of industrial machinery, the Technical Training Section of the Department of Industrial Education of Chrysler Corp., Detroit, has established an Electronics Training Program to familiarize some of its employees with the mechanics of this equipment.

The course was developed and presented by instructors Bill Cesarz and Lou Pfeifer. Prior to the actual preparation of the course, Bill Cesarz talked with foremen and journeymen from the different plants to find out what problems they had, and he outlined the course with these particular problems in mind. The course has been planned for a 48-week period, with a two-hour session held on company time each week, or a total of 96 hours of training. A topic outline of the course is shown in Fig. 3.

Here is how the men are selected for the electronics training course. A notice is sent out to the Supervisor of Industrial Education at the various plants, announcing when the new class is to start. Along with the letter, a supply of applications is furnished. The plant's Supervisor of Industrial Education forwards the applications to the interested departments within his plant. The individual departmental supervisors give the applications to those persons who have indicated a willingness to participate in the program and will benefit from this type of training in performing their work.

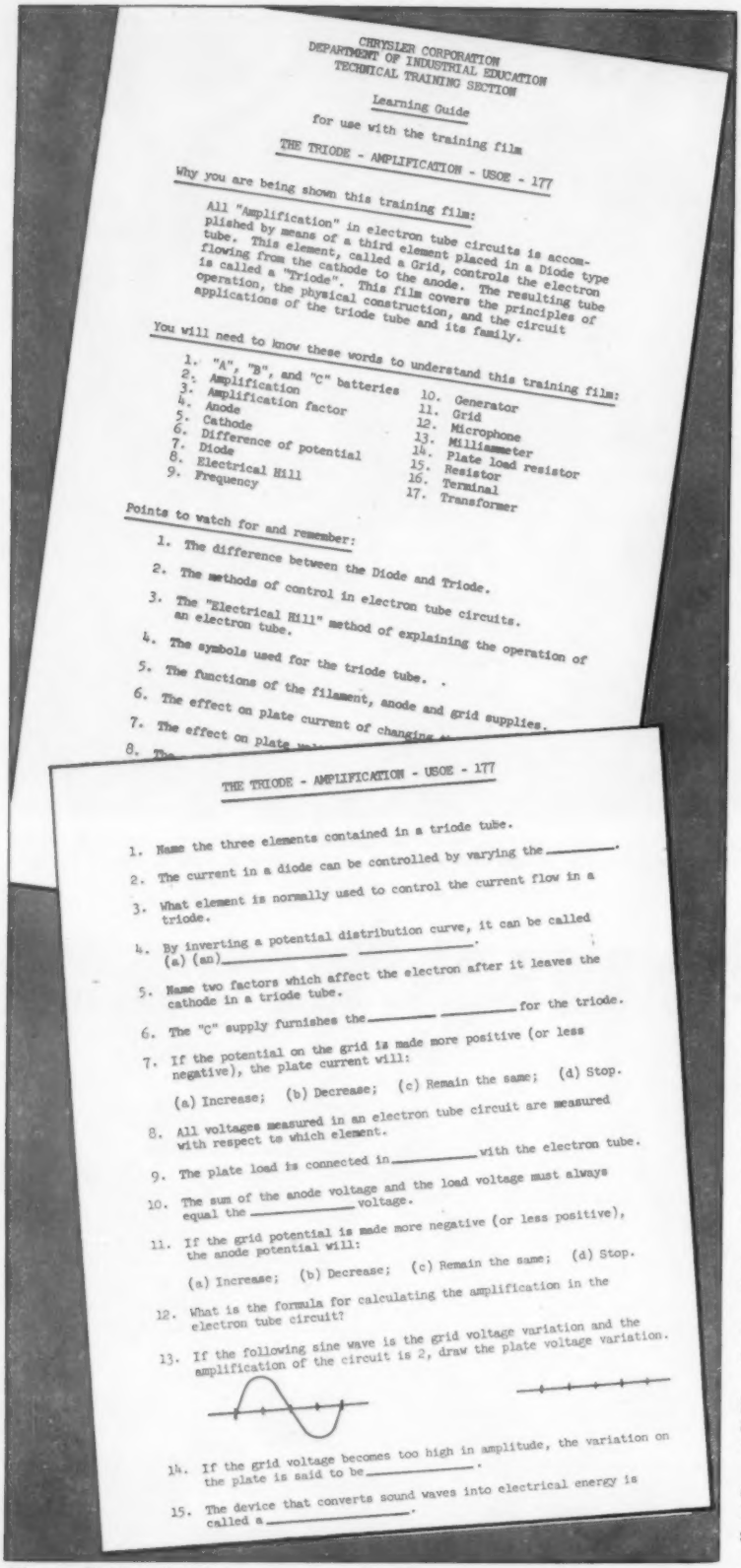
How Classes Are Formed

The applications are then approved by the departmental supervisor and returned to the plant supervisor of Industrial Education. He returns them to the Technical Training Section.

At the Technical Training office, the application forms are reviewed by the electronics instructor, and the chief instructor of the Technical Training Section, Clifford E. Bergstrom. From the information on the applications, the instructors attempt to place the men with similar backgrounds in a particular group. They have found that it is beneficial to limit the training groups to 25 men. In most cases, the applicant is a practicing journeyman who has had prior training in electricity. After the groups have been formed, the men at the various plants are notified when and where the classes will be held.

An example of how the instructors travel to conduct this course can be seen from the following schedule of a typical week.

On Tuesday afternoon the instructor will conduct a class in Industrial Electronics I at Detroit. On Wednesday, he will leave Detroit at 7:45 in the morning and arrive at Indianapolis at 9:00 a.m. He will conduct three classes in Industrial Electronics 2 and



CHRYSLER CORPORATION
DEPARTMENT OF INDUSTRIAL EDUCATION
TECHNICAL TRAINING SECTION

Learning Guide

for use with the training film

THE TRIODE - AMPLIFICATION - USOE - 177

Why you are being shown this training film:

All "Amplification" in electron tube circuits is accomplished by means of a third element placed in a Diode type tube. This element, called a Grid, controls the electron flowing from the cathode to the anode. The resulting tube is called a "Triode". This film covers the principles of operation, the physical construction, and the circuit applications of the triode tube and its family.

You will need to know these words to understand this training film:

1. "A", "B", and "C" batteries
2. Amplification
3. Amplification factor
4. Anode
5. Cathode
6. Difference of potential
7. Diode
8. Electrical Hill
9. Frequency
10. Generator
11. Grid
12. Microphone
13. Millimeter
14. Plate load resistor
15. Resistor
16. Terminal
17. Transformer

Points to watch for and remember:

1. The difference between the Diode and Triode.
2. The methods of control in electron tube circuits.
3. The "Electrical Hill" method of explaining the operation of an electron tube.
4. The symbols used for the triode tube.
5. The functions of the filament, anode and grid supplies.
6. The effect on plate current of changing
7. The effect on plate
8. The

THE TRIODE - AMPLIFICATION - USOE - 177

1. Name the three elements contained in a triode tube.
2. The current in a diode can be controlled by varying the _____.
3. What element is normally used to control the current flow in a triode.
4. By inverting a potential distribution curve, it can be called _____ _____.
   (a) (an)_____
5. Name two factors which affect the electron after it leaves the cathode in a triode tube.
6. The "C" supply furnishes the _____ _____ for the triode.
7. If the potential on the grid is made more positive (or less negative), the plate current will:
   (a) Increase; (b) Decrease; (c) Remain the same; (d) Stop.
8. All voltages measured in an electron tube circuit are measured with respect to which element.
9. The plate load is connected in _____ with the electron tube.
10. The sum of the anode voltage and the load voltage must always equal the _____ voltage.
11. If the grid potential is made more negative (or less positive), the anode potential will:
    (a) Increase; (b) Decrease; (c) Remain the same; (d) Stop.
12. What is the formula for calculating the amplification in the electron tube circuit?
13. If the following sine wave is the grid voltage variation and the amplification of the circuit is 2, draw the plate voltage variation.
14. If the grid voltage becomes too high in amplitude, the variation on the plate is said to be _____.
15. The device that converts sound waves into electrical energy is called a _____.

Fig. 2. Before students see training film they are handed introductory sheet (top illustration). Bottom illustration shows questions they will be asked later.

3 and Industrial Electro-Hydraulics 1. At 5:00 p.m. he will leave Indianapolis and arrive in Detroit at 6:15 p.m.

On Thursday, he will conduct a class in Industrial Electronics 4 in Detroit. On Friday, he will travel to Windsor, Ontario, to conduct two classes in Industrial Electronics 6 and 7. After lunch, he travels back to Detroit to conduct another class in Industrial Electronics 5.

At the end of each twelve-week period, the students are given a review of the material discussed during that period. This is done more to guide the instructor than to test the students. The results of this review tell the instructor where more emphasis should be placed and which subjects have been thoroughly covered.

A Progress Report on the student is forwarded to the Supervisor of Industrial Education at the student's plant. He will sign the card and forward it to the student's immediate supervisor so that he can see what progress the student is making. After the supervisor signs it, it is returned to the Supervisor of Industrial Education for filing as a portion of the student's permanent record.

Visual Aids

Training films, models of controls, panelboards, etc., are used extensively in the discussion of the various topics listed in the outline. In fact, during the latter portion of each unit in the course, the instructor has found it helpful to use a manufacturer's manual in connection with a particular piece of equipment. In this way, the students become familiar with the use of a manual in relation to the equipment and to a specific problem.

In using training films, the instructors go one step further by passing out an introductory sheet, describing what the film will cover and calling the students' attention to several of the things they will see. A sample of one of the instruction sheets and the examination covering the film are shown in Fig. 2.

Following is a list of the visual aids which the instructors have found helpful in teaching the course.

Industrial Electronics Training Course—12 films; black and white sound slidefilms; General Electric Co.

The Triode: Amplification—Motion picture; 16 mm sound; 14 minutes; also available in film strip; U.S.O.E. 177.

The Diode: Principles and Applications—Motion picture; 16 mm sound; 17 minutes; also available in film strip; U.S.O.E. 176.

Principles of Gas-Filled Tubes—Motion picture; 16 mm sound; 15

(Continued on page 226)

TOPIC OUTLINE
INDUSTRIAL ELECTRONICS

Part I—Electricity Fundamentals

1. Electron flow fundamentals
2. Ohm's Law and principles of tubes
3. Fundamentals of rectifiers
4. Rectifier filters and the triode tube
5. Triode circuits
6. Gas-filled tubes.
7. A-c theory
8. A-c circuits
9. Timing circuits
10. Ignitrons and phase shifters
11. Control circuits
12. Trouble-shooting principles

Part II—Welder Control Systems

13. Resistance welding fundamentals
14. Timing action and circuits
15. Sequence timers
16. Synchronous timers
17. Heat control methods
18. Heat control circuits
19. Arc welding fundamentals
20. Motor control for arc welders
21. Arc welding control
22. Voltage and current regulation
23. Energy storage welders
24. Three phase welding systems

Part III—Motor and Generator Systems

25. Principles of motors and generators
26. Control of d-c motors
27. Motor speed control systems
28. Thy-mo-trol system
29. Small motor controls
30. Large motor controls
31. Adjusto Spede controller
32. Control of generators
33. Generator voltage control
34. Amplidyne systems
35. Generator frequency control
36. Complete motor-generator system

Part IV—Induction Heaters and Miscellaneous

37. Induction heating and fundamentals
38. Motor-generator methods
39. Electron tube generator
40. Electron tube systems
41. Automatic cycle systems
42. Dielectric heater systems
43. Time delay
44. Light controls
45. Counting methods
46. Temperature control
47. Transducers
48. Amplifiers and recorders

Fig. 3. The Electronics Training Course is planned for a 48-week period, with 2 hours of training each week, or a total of 96 hours of training. Outline of course is shown above. Upon completion, the students receive a certificate

Fig. 4. This electronic control panel at the Lynch Road Plant holds no mysteries for Joe Halladay, course-graduate

Fig. 5. The course was also helpful to journeyman Vincent Budzeikas, of Highland Park Plant's maintenance section

Low-Level Utilities Ease Maintenance

Douglas-Pioneered Pipe-Carrying Stanchions Pay Off

"LESS COSTLY to maintain... easier to get at...more versatile in every way."

That's the appraisal of L. Stagnaro, general foreman of maintenance, and R. J. Bray, foreman of electrical maintenance, at Douglas Aircraft's sprawling Torrance, Calif. plant—which has literally taken its utilities down from the rafters.

Maintenance chief Stagnaro is talking about a Douglas-developed concept in conduiting: low-level installation.

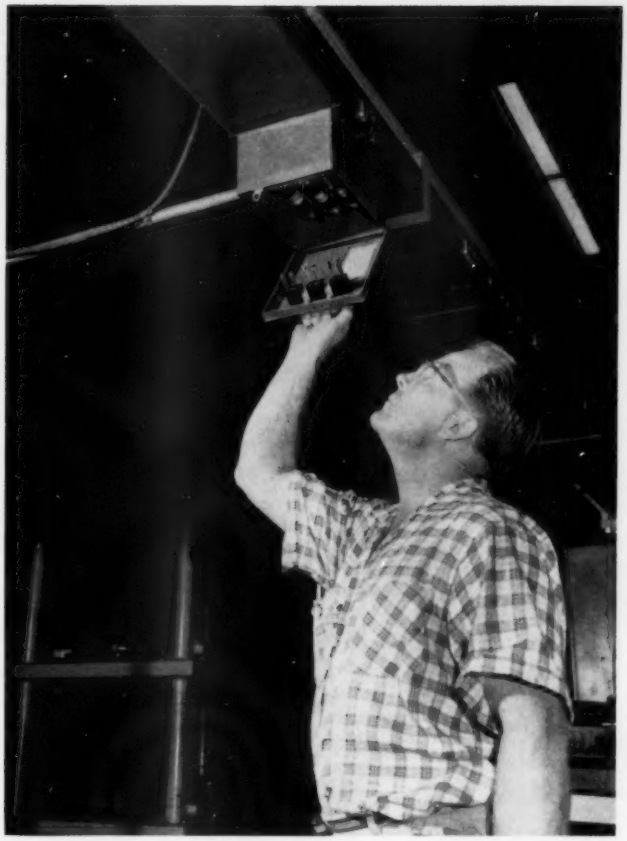
At Douglas, a half dozen key departments, among them machining and tooling, are served from stanchion-supported runs of low-level conduit—conduits carrying water, air, gas, and electricity. And carrying them but 7 to 10 ft above the production floor.

Of the Torrance plant's some 21,000 ft of utility runs, fully 6000 lineal feet are low-level. The remaining 15,000 ft of conventional high-bay lines serve as feeders—to the low-level system.

This low-level concept, pioneered at Douglas and already fast spreading through industry, seems at first glance to violate a time-honored engineering principle: that a plant should get its utilities overhead—and out of the way.

"Not so," disclaim Douglas maintenance engineers. "The overhead theory is more costly than useful. Admittedly, there are some plants—and some plant areas—where high-bay conduiting is the only practicable way. But high-bay, overhead placement becomes something less than economic when you're serving a great concentration of machinery in a relatively compact area—especially where departmental moves and machine rearrangements ebb and flow with every major contract."

High-bay conduiting becomes burdensome, too, where craneways inter-



Above: Low-level conduiting makes inspection and maintenance from floor far easier, less costly, with attendant greater safety

In this typical low-level run of utilities, left, note cross-overs and their safety markings over center aisle of Douglas' machine shop

fere with utility runs—as at Douglas.

Douglas' low-level system falls midway between two more conventional applications: high-bay and fixed bench connections. The former, engineers at Douglas believe, is too inflexible, too costly to maintain. The latter presupposes few machine shifts and doesn't allow for expansion-contraction of departments with increase-decrease in work load or changes in manufacturing methods.

Short Machine Drops

The Concept: Low-level conduit aims at bringing utilities as close to a machine as possible—thus reducing drops and hook-in runs. At Douglas, such runs are usually held to about 10 ft. But paramount is the system's low maintenance cost—and the fact that, through standardization of piping and conduit, utility runs can be prefabricated. Importantly, almost every foot of utility run is reusable.

How It Works: Douglas' machine shop is perhaps typical. This shop is served by low-level conduit—two lines of utilities serving individual banks of machinery. A typical low-level run involves conduiting and piping supported by floor-installed stanchions. Three-inch diameter, the common-pipe stanchions are spaced about 20 ft on centers. Atop stanchions rides a 4½-by 9½-in. bus duct, carrying 110 to 440 volts. Unistrut channels support all utility lines and clamp to the 4-in. I-beam. The air line is carried atop the I-beam. Stanchions are embedded 4 in. into the concrete floor and grouted.

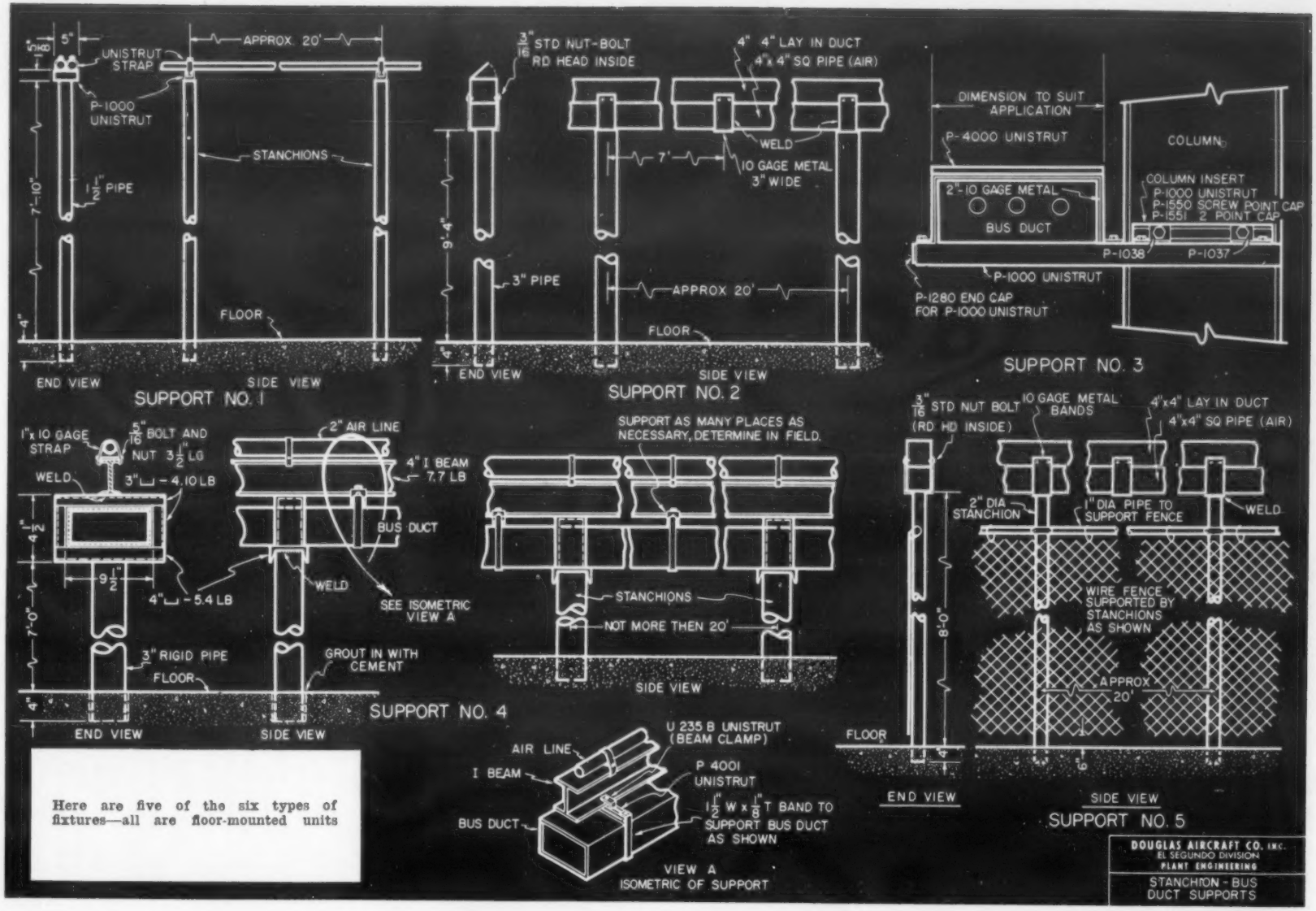
Utilities in the machine shop are carried a minimum 7 ft above the production floor, which puts the bus duct a maximum 6 ft 6 in. above floor.

Actually, Douglas has standardized to six prefabricated types of low-level support structures. All carry utilities between 7 and 10 ft above the floor. Four types are floor-installed. A fifth clamps to existing columns. The sixth features a ¼-in. by 2-in. by 2-in. angle iron, clamped to existing overhead structural I-beams, the down-hanging support carrying utility piping and wiring. But again—utilities are brought to within 7 ft of the production floor.

Douglas' Six Typical Supports

Type No. 1: 1½ diameter stanchions carry small diameter utilities. Atop each stanchion is a P-1000 Unistrut channel in which the pipes fit, held by Unistrut straps.

Type No. 2: This standardized structure carries air in a 4-in. square pipe, the pipe supporting a 4-in. by 4-in.



Here are five of the six types of fixtures—all are floor-mounted units

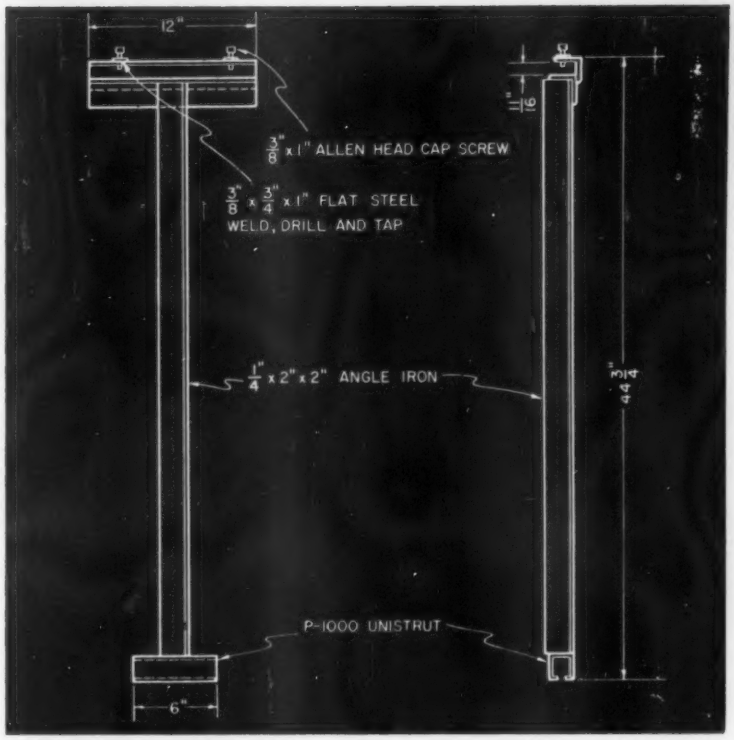
lay-in duct. Stanchions are 3-in. diameter common pipe spaced on approximately 20-ft centers, the square air run standing some 9 ft 4 in. from the production floor. Air pipe is held in place by brackets atop stanchions. Lay-in ducts are clamped to the bracket using 16-gage metal straps, fastened to the lay-in unit by 3/16-in. bolts.

Although this structural unit with its 4-in. square pipe is more costly, this additional pipe expense is easily offset by reduced labor costs and by eliminating need for the I-beam used in Type No. 4.

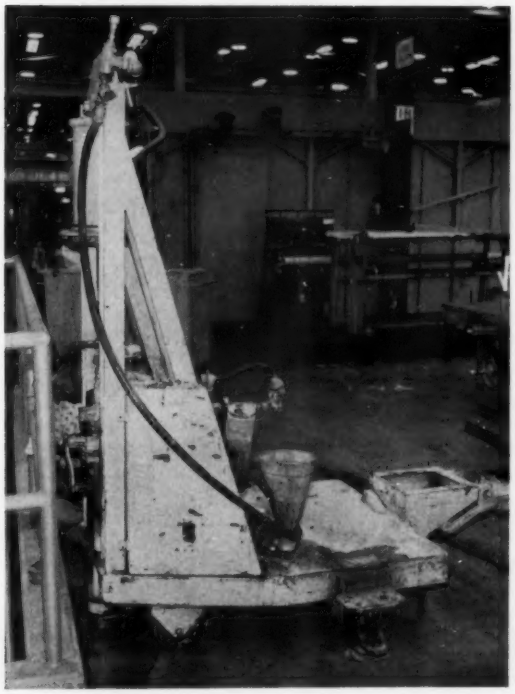
The lay-in duct, fed from a power panel, primarily feeds machines of relatively low power requirements.

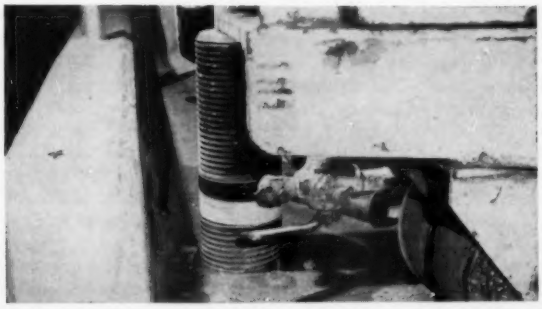
Type No. 3: This standardized structure bolts to existing columns. In essence, it's a P-1000 Unistrut arm fixed to the column with screw point caps. Arm supports a run of bus duct, with necessary intermediate overhead supports. Again, utilities are installed about 7 ft above production floor.

Type No. 4: This structure has been partially described above. The bus duct's underside is 7 ft above the floor. The highest utility piping, about 8 ft. *In detail:* bus duct is supported from each stanchion through a channel iron box structure which is welded to the I-beam. Between stanchions, as necessary, the bus duct is additionally supported from the beam by 1½-in. wide by ⅛-in. metal bands. Bolted to the bands are P-4001 Unistrut fixtures which are in turn clamped to the beam by a U-235B Unistrut clamp. Piping (typically, a 2-in. air line) rides on top of the I-beam, held a 1-in. by 10-in. galvanized strap, strap being bolted to top flange of the beam (with a

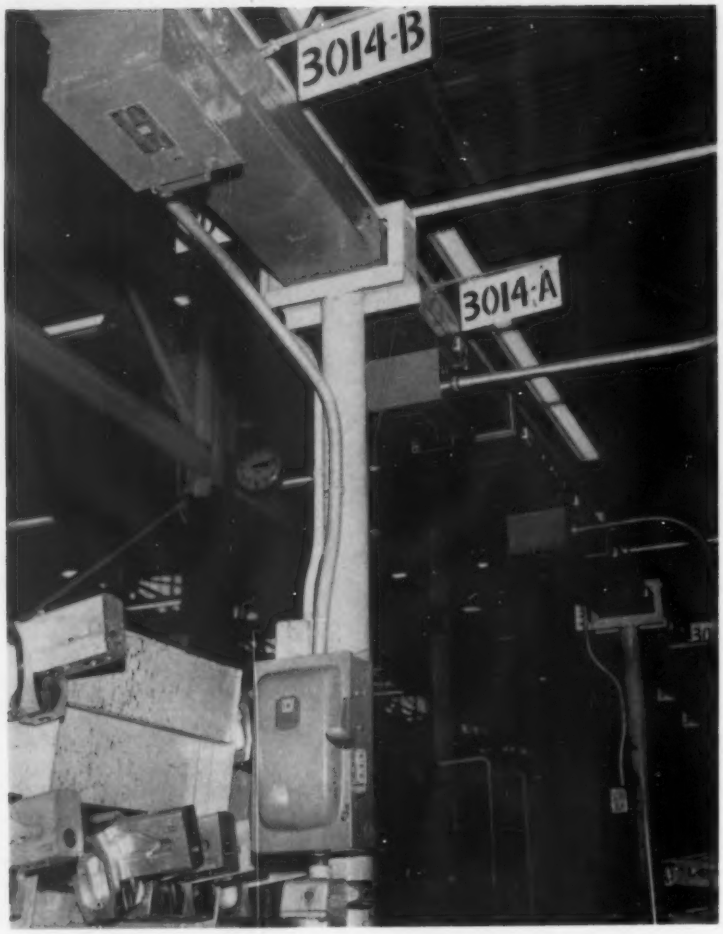


This drawing shows the one hanging fixture used by Douglas for low-level conduiting. Such supports are usually employed to carry air and electrical headers





These three photos show the portable stanchion drilling machine. Drill cores out stanchion-deep piece of concrete



Another view of typical low-level run of conduiting through machining section

5/16-in. bolt and nut, 3½ in. long.)

Type No. 5: This standardized structure, like Type No. 2, carries air and a lay-in electrical duct. Like Type No. 2, the rigid air run is 4 in. square and supports a similarly dimensioned lay-in duct. Only differences are size of stanchions (2-in. diameter rather than 3-in.) and their height from floor (8 ft rather than 9 ft 4 in.). A special feature of the Type No. 5 structure is its adaptability as support for wire fencing, enclosing some security areas. Fencing hangs from 1-in. diameter pipe fastened to the stanchions, the fencing beginning 6 in. off the floor and rising to a height of about 6 ft. Fence-supports add significant strength to utility stanchions, permit their smaller diameters.

Type No. 6: This standardized structure differs from the others in that it's a hanging fixture—consisting of ¼-in. by 2-in. by 2-in. angle irons (4 ft 4¾ in. in length), bolted to existing overhead I-beams. Such supports, at Douglas, usually carry standard air and electrical headers, with intermediate supports as necessary. Considering that plug-in drops (each about 16 in. long) hang from the headers, effect is to bring utilities within about 6 ft 9 in. of the production floor.

Essentially, then, these six are the basic standardized, prefabricated supports used by Douglas in its low-level systems.

One obvious advantage is prefabrication—a cost-saver. Another, that most runs can be inspected periodically from the floor or by use of low ladders. And plugging-in to any duct becomes a tip-toe job, rather than one involving ladders and interference with production machines.

But chief advantage remains flexibility. Any prefab run can be moved within a few hours. And because of prefabbing, almost all ducting and piping are reusable.

Installation: Flexibility is maximized through Douglas' use of grouting around stanchions.

In quick-laying a typical utility run (all work done from the floor), a maintenance man first lays out a chalk line. Next, at each stanchion location he fastens to the floor a hardwood, circular block, its diameter the same as the stanchion's ID. Block acts as guide for a special carbide core drill which Douglas has rigged to a portable cart. Cart is weighted with lead so it won't lift during drilling. An air motor is mounted on the cart. The core drill is powered by an air cylinder.

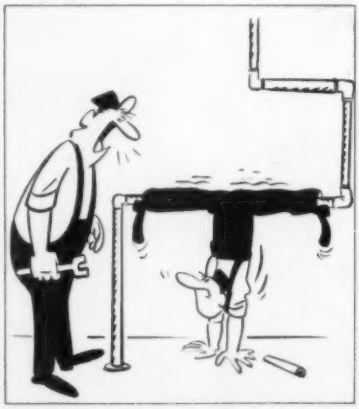
Cart is positioned over the cylindrical wooden guide. Drill is then lowered over this. Once the drill has been sufficiently started, it's lifted and the guide is removed. Drill then takes out a 4-in. core of concrete—taking it up intact. Drilling time per stanchion is approximately 20 minutes. Then, the stanchion is set and grouted. This light-mix cement makes stanchion removal a simple job. Base of the stanchion is loosened with a chisel, the stanchion jiggled until it's free, then lifted clear, and the hole filled and leveled—a 10-minute job at most.

"Big advantages," declares Maintenance Foreman Stagnaro, "are flexibility, prefabricated runs, and their ease of installation and removal—all from the floor, without time-consuming ladder climbs."

What of overhead clearance? Douglas, in three years of low-level installations, has experienced but one service interruption due to breakage. One reason, of course, is that few mobile cranes move through low-level areas. And above heavy traffic aisles, runs are raised to conventional underroof height.

"Our average machine-to-utility run —with low-level conduits—approximates only about 10 ft," emphasized Douglas engineers. "Compare this with perhaps 40, even 50 ft of run to every machine when utilities were high overhead."

That's low-level conduit—a system pioneered by Douglas' maintenance engineers. A system already finding application in many other plants.



"My new helper, I presume?"

Why Do These Pumps Lose Suction?

Author Suggests Solutions for Correcting This Problem

By IGOR J. KARASSIK, Worthington Corporation

INDUSTRY CALLS on the pump to do many jobs of moving liquids, either for processing or for such general services as water supply, boiler feed, condensate return, etc. With pumps performing so many tasks, plant engineers are always on the lookout to learn how they can get the best use from their equipment.

One industrial plant was faced with the problem of the pumps losing suction. The author analyzes this particular problem and offers possible solutions. If you are confronted with a similar problem, possibly the suggestions may prove helpful to you.

Here Are the Facts

Question—We experience difficulty with two 3-in. centrifugal pumps, each direct-driven by a 5-hp squirrel-cage, 3-phase motor. The pumps have a common suction and discharge; they fill a remote storage tank at 80 ft head, under control of a float switch. The water spills into the top of the reservoir for aeration.

Each pump is equipped with stop valves and the units are intended to operate separately, one acting as a standby for the other. The suctions are connected and go straight down through the concrete pump-house floor in a 3-in. bore pipe which had been used for a smaller installation. The suction pipe had to be reduced to 2½ in. and fitted with a vertical check valve which just slides down the bore pipe. The suction lift is about 18 to 21 ft.

Each motor has a magnetic starter with a single phase solenoid operated by the float switch. In addition, each circuit is equipped with a phase-failure, phase-reversal cut-out. The wiring is such that a two-way manual switch can put either set into operation.

Trouble has been encountered through the pump losing its suction in periods of dry weather. These pumps are intended to run unattended except for a weekly inspection visit. It is not practical to dig up the floor and put down a large bore or well with float control, which of course would be the simplest solution. We have been considering various alterations for protecting these units and would like some suggestions on this problem.

Answer—While some of the important facts connected with this installation are missing, it is possible to reconstruct them in an approximate manner. Neither the capacity nor the actual total head of these two 3-in. pumps is given; however, it is probable that the 80 ft referred to is the discharge head. Adding to this the average suction lift, gives a total head of approximately 100 ft. Thus, in order to load a 5-hp motor, the capacity is probably between 90 and 100 gpm.

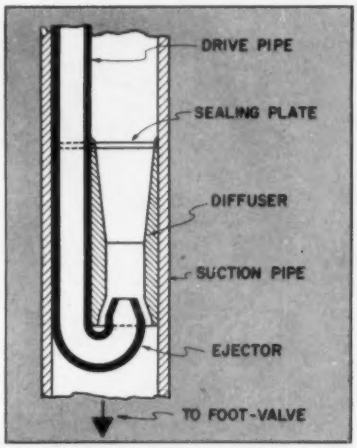
The suction lift of 18 to 21 ft mentioned is most likely the static elevation between the level of the water in the well and the pump centerline. Thus, to get the actual suction lift, it is necessary to add the frictional losses in the suction line.

Assuming a capacity of 100 gpm, this loss is 12 ft per 100 ft of 2½-in. pipe or about 2.5 ft plus the loss of the check valve which acts as a foot-valve. This latter is probably extremely high. Under normal conditions, it is generally recommended that the size of a foot-valve be such that its port area is at least twice the area of the suction piping. Here, the physical limitations make such a relationship impossible and the foot-valve losses will probably range between 2 and 4 ft. The total suction lift may therefore vary from 22 to 27 ft.

Finally, the source of the water supply is not exactly defined. However, the reference to dry weather difficulties infers that the water comes from a natural well of varying level.

The foregoing analysis indicates that all the difficulties experienced in this installation are traceable to an excessive suction lift. In this particular case, this excessive lift is aggravated by the fact that the high suction inlet velocities result in the formation of eddies at the pump suction and in entrainment of large quantities of air.

Natural well water is generally well saturated with dissolved gases which, under the vacuum conditions prevailing because of the high lift, are liberated at the pump entrance and help in the creation of air and gas pockets in the suction passageways. Taking all these facts into consideration, it is obvious that the pumps will lose suction at such times when the level in the well goes to its minimum.



Suggested arrangement of hydraulic ejector designed to fit the 2½ in. pipe

Depending upon various factors, which can only be established from a more complete knowledge of the installation itself, of the water-supply requirements and of the relative economy of the alterations involved, there are several difficulties. These arrangements fall into two separate categories: (1) Decrease of the unfavorable effects of high suction lift operation; or (2) Elimination of a condition whereby the pumps handle the water under a high suction lift.

Possible Solutions

Inasmuch as a 3-in. bore pipe is already installed, there is no reason why the friction losses and the suction velocity could not be appreciably reduced by utilizing this pipe instead of the 2½-in. pipe. This might possibly be accomplished by lowering the foot-valve to the bottom of the 3-in. bore pipe and sealing it at that point. The suction lift would be reduced and the amount of entrained air decreased.

In addition, the installation should be checked for possible air leakage into the suction line from the pump which is standing idle. Since the pumps have a common suction, there appears to be nothing to prevent the leakage of air through the stuffing boxes of the idle pump and then through its suction passages into the common suction pipe. If this leakage of air were to be ex-

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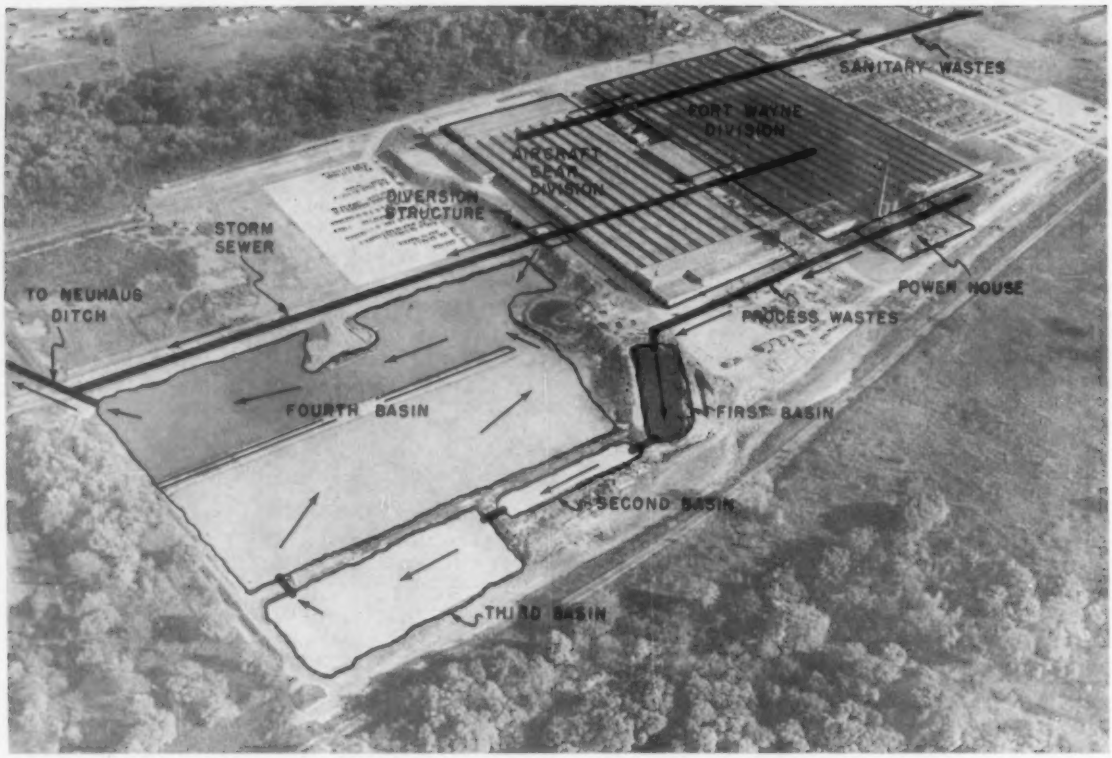

Fig. 1. This new lagoon system was built to take care of industrial wastes from the two plants shown at right. The new system employs four basins instead of two, a regulating chamber, and provisions for the reuse of cooling water

Designing a Lagoon System for Waste

Waste Engineer and Plant Engineer Put Heads Together on This One

By CHARLES R. GRIFFITH, Waste Engineer, Fort Wayne Division, Dana Corp.

AFTER THE FEELING of panic, or anger — depending upon the attitude of the plant manager—has subsided after a plant is notified that it must cease polluting a stream, the problem generally is turned over to the plant engineer or to a lawyer, or to both. The point of this discussion is not what the lawyer can do about it, but what the plant engineer can, and will, do.

In most cases, the plant engineer will fall back on previous experience and think along the lines of a system that he has seen in operation, or he will call in an outside engineering firm. Surely, there can be no criticism of either choice—and there is none if sufficient thought and investigation is given to a study of the merits of the many methods of treatment that may be employed to do the job.

By following this sound advice it may be possible to so fit the system to employ natural topographical features of the plant property which may: (1) increase the efficiency of the system; (2) reduce the cost of installation; and (3) make use of marginal land that is of little value for other use. One method of purification that may employ all these advantages is a system of lagoons. Practicability of the use of lagoons is dependent upon the following factors: (1) Amenable wastes; (2) Degree of treatment required; (3) Sufficient area; and (4) Proper design. All four points are interrelated and interdependent upon each other.

It is necessary to know, or accurately estimate, the volume of the waste, and in most cases this can be done without too much trouble. It is equally important to know the source of the wastes, their composition and toxicity. Various chemical and biological tests are required before this information is available. With such knowledge an engineer may be able to predict what process will be required. However, unless such tests include a sedimentation check (where a representative sample of the waste is held for a sufficient length of time and observed frequently) natural clarifying properties in the waste may be overlooked. Regardless of what method of treatment is considered, it is a basic fact that the stability of the waste should be known.

In the metalworking field, particularly in hard water areas, wastes are likely to be self-clarifying to some extent. This is quite apparent merely by visual observation of those wastes where a heavy floc is noticeable in the sewer system. In others, the floc may be a function of time but can be determined by the detention test previously mentioned.

In observing a sample, measurements of turbidity, alkalinity, D.O., B.O.D., pH, oil, and solids should

be made at regular intervals. B.O.D. reduction, if any, during the period of observation, would be due chiefly to reduction of the suspended load, and it would not be possible to measure the biological activity that is an essential part of a properly designed lagoon.

If no precipitation or clarification takes place within a period of days, then consideration of a lagoon system can be (1) dropped; (2) used with chemical coagulants; or (3) used as a secondary treatment or stabilizing basin to supplement other methods of purification.

Size of Waste Area

If the tests indicate that a lagoon is feasible and the volume of the wastes is known, then the size of the area required is the next problem. Size is dependent upon the degree of purification required and the facility of clarification of the waste to be handled. The degree of purification usually is set by the regulating agency, generally a city, state, or federal commission. Knowing what standards are to be met and with some basic information derived from laboratory tests, or from a pilot lagoon (if time permits operation of such a unit) the question of sufficient time, expressed in area rather than hours, may be estimated.

At this point it may be found that the land available is not of sufficient size. In such cases chemical treatment may be used to supplement the lagoon. Tests on some wastes that required five days detention to break emulsions were clarified in minutes, or hours, by the use of small amounts of coagulants, but generally resulted in an increased volume of sludge. In most cases it is preferable to employ time rather than chemicals, if there is a choice. With sufficient area available the questions of size, shape, number of basins, etc., arise and are points of controversy at this time.

One large basin normally will provide better aeration from wind and wave action; however, in the case of industrial wastes, particularly those containing oil, it may be impossible to collect or to remove the oil satisfactorily. A series of basins should be provided. In a system with a rapidly settling floc and good oil separation, the size of the first basin should be restricted to the minimum area needed for separation to take place.

Preference should be given to a long, narrow basin over a short, wide one of equal surface area. It should be of sufficient depth to store the settled solids and floating matter to provide whatever frequency of clean-out that may be desired. A second basin similar to, or smaller than, the first will provide a safety factor to prevent sludge or oil carryover.

The final basin should be as large as required (with a 10 per cent safety factor) to provide biological treatment and stabilization. If possible, the first basin should be surrounded by the other basins to provide additional protection in case of dike leakage. All basins should be equipped with overflow structures which prevent floating materials from flowing over. These structures should provide a slotted pipe, or similar method, to permit skimming and removal of the floating matter.

Good dike construction requires proper sloping of the banks, protection against erosion, and sufficient freeboard to offset settling of the dike. With adequate freeboard available, it is possible to design the effluent structure so that the water level in the final basin may be raised if desired. If such flexibility is provided the lagoon system could be used as a temporary impounding pond when the condition of the stream, or the effluent, would be improved by additional detention.

Consider Effluent Reuse

In designing a lagoon system special consideration should be given to the reuse of the effluent. In some areas the lagoon has tremendous value as a reservoir for water use and fire protection. It likewise provides protection by dilution against possible slug contamination of a toxic waste that no other system offers. It is not advisable to put more area into use than actually is required since healthy biological activity, and particularly the algae, are dependent upon sufficient nutrient to maintain growth and de-

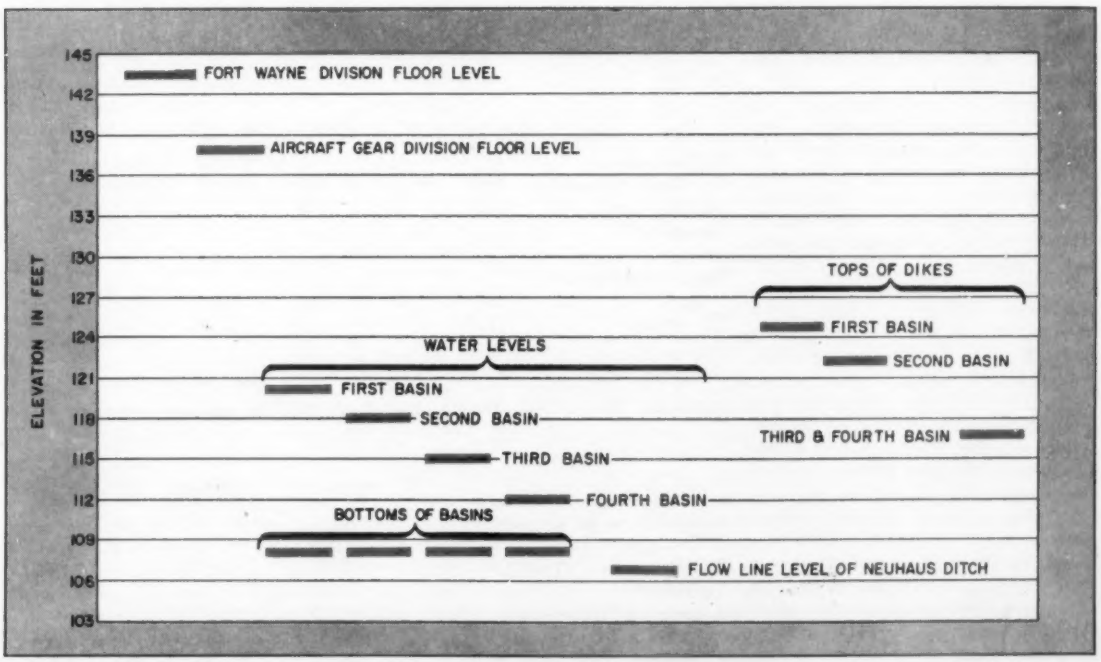

Fig. 2. Elevations of the floor levels of the Fort Wayne Division and the Aircraft Gear plants, the tops of the dikes for the four basins, the water levels and bottoms of the four basins, and flow line of Neuhaus Ditch are shown in graph

Fig. 3. View of original lagooning system. Advantage was taken of natural topographical features to cut costs. Second basin was a diked, swampy area

velopment; therefore, if possible, some flexibility in loading should be provided to maintain the time cycle and food supply upon which the algae depend.

Segregation of the wastes, as far as practical, should be followed in any system since it is more economical to treat a concentrated waste and obviously foolish to treat cooling water that requires no clarification. Sanitary wastes, if not in too large a volume, may be handled by a lagoon system. While all systems are subject to review and approval by the regulating agency, it is particularly important that lagoons handling sanitary wastes be discussed in detail with the regulating agency or Board of Health before construction begins. Such discussion will eliminate confusion, and the experience of the agency in such matters may provide a higher efficiency at less cost.

The discussion to this point has centered on general considerations that are more or less applicable to all lagoon systems. Although no data has been presented to qualify the statements made previously, such data is available to depict just how time, area, type of wastes, size and shape of basins, etc., have affected the original installation and are affecting presently the revised lagoon system of two plants of the Dana Corp. at Fort Wayne, Indiana.

Prior to 1952, the original lagoon were installed in 1946. This system system consisted of two basins which was used by the Fort Wayne Division until construction of the new Aircraft Gear plant required complete relocation of the old system. The data collected by the author and the plant engineer, Al Frautschi, during the five years of operation were of great value and permitted many improvements to be incorporated in the new design.

The improvements consisted of the following items: four basins in place of two; a regulating chamber that permits diversion to the final basin of as much of the 200 gpm cooling water flow as is desired to adjust the detention time in this basin; provisions for reuse of cooling water; better overflow structures to retain floating matter and to permit removal of oil; and more efficient use of the difference in elevation between the basins to provide better aeration.

In the original system advantage was taken of the natural topographical features to keep costs low, and the second basin was merely a diked, swampy area which well served the purpose. However, at the time this system was replaced fill dirt was required for the new building and parking lot, and by careful planning such fill became available by digging the new basins. Both systems were benefitted greatly by the fall of 32 feet from the plant floor level to the waste treatment area since this fall permits good drainage and many opportunities to aerate the wastes as they flow through the system. In the new system, Fig. 1, aeration is more effective because the overflow structures were designed to make better use of this fall.

Since the whole area is clay, little, if any, percolation is involved. This makes little difference in this particular system since there are no seriously toxic wastes of any consequence that would tend to pollute underground water supplies. However, in areas where percolation is a factor, a thorough study must be made to determine any potentially toxic contaminant that might adversely affect the water beneath the area.

The old system, while lacking in eye appeal, provided an effluent that was acceptable to all agencies.

A comparison of the effluents of the two systems is shown in Table I. With the exception of turbidity and oil, the average of the new system has shown considerable improvement over the old. The higher average oil value is due chiefly to an analytical error on two samples, which raised the average, and to the loss of the "duck weed" growth that grew so prolifically on the old system and served as an efficient filter in preventing oil from discharging to the stream. Increase in turbidity is not fully explainable.

Table I. Average results of analytical tests of final effluents of the two systems

	Old System			New System		
	Maximum	Average	Minimum	Maximum	Average	Minimum
D.O.—ppm	10.6	3.6	0.4	14.0	10.5	6.0
Per Cent Saturation	98.0	37.5	4.0	171.0	99.5	49.0
B.O.D.—ppm	15.3	7.4	2.4	7.3	4.2	0.6
Turbidity*	85.0	96.2	100.0	83.0	92.0	99.0
pH	7.9	7.4	7.0	8.8	8.4	7.9
Suspended Solids—ppm	75.0	19.0	7.0	25.0	12.0	1.0
Oil—ppm	18.4	7.1	3.1	22.0	11.5	5.9

*Per cent light transmission. Distilled water = 100 per cent

Table II. First Basin. Influent and effluent readings and per cent of reduction

	Influent	Effluent	Per Cent Reduction
Temperature (in degrees F)	78.0	78.0	——
D.O.—ppm	0.0	0.0	——
B.O.D.—ppm	202.0	52.0	74.2
Turbidity*	12.0	58.0	——
Suspended Solids—ppm	1484.0	79.0	94.7
Vol. Solids—ppm	1367.0	61.0	——
Oil—ppm	2543.0	92.2	96.4

*All turbidity readings made on Photelometer and expressed in per cent light transmission. Distilled water = 100 per cent

The increased biological activity is obvious from the high D.O. and per cent saturation, and the lower B.O.D. average.

For a better indication of the contribution of each basin in clarifying the wastes, it is necessary to consider what happens in each individual unit. Test data cover a two year period of operation of the Fort Wayne Division and about 16 months operation of the Aircraft Gear plant. Both are typical large machine shops, with wastes coming from machining, assembling, finishing, and related processes.

In the first basin of the system, the reduction accomplished in a basin of 1,237,500 gal at a flow of 250 gpm is averaged in Table II.

Data on the Four Basins

This reduction takes place in a calculated detention time of 3.4 days but the actual time is known to be much less than this. Reduction of oil and suspended solids is high, and B.O.D. is fair, but the effluent is not satisfactory for discharge unless considerable dilution is available in the stream. Turbidity has decreased, but at this reading (58), the waste is white and milky in appearance. The first basin is completely covered with oil which is removed, as required, through a slotted pipe arrangement at the effluent structure. A baffle retains the oil and the flow is siphoned to the next basin. Solids, which deposit at the rate of two tons per day (dry basis) will be removed approximately once every five years by clamshell.

In the second basin, having a holding capacity of 975,000 gal, some improvement is shown. Detention time is 2.7 days. See Table III.

The chief contribution of this basin is shown in the additional reduction of B.O.D., and it provides a safety factor to prevent oil that may be lost from the first basin from passing on through the system.

The volume of the third basin is about 1,687,500 gal with an estimated detention time of 4.7 days. Data on this basin is shown in Table IV.

Since the heavy load of the wastes have been absorbed in the first and second basins, the problem of "polishing" the wastes begin, that is, per cent reductions of objectionable features are very low for the third basin but the D.O. has risen from 0.0 to 1.2 ppm and aerobic action has begun. In a large stream, the effluent at this point might be tolerated.

The fourth basin is an area of about 45 acre feet (14,625,000 gal) and is a true biological lagoon and functions as such. See Table V.

The fourth basin effluent, which flows to a small creek, is high in D.O., low in B.O.D., oil, and suspended solids. It is well stabilized and matches almost perfectly the analysis of the stream into which it flows. B.O.D. loading for the system amounts to only 12 lb per acre foot per day, which is low in relation to the loadings often suggested for lagoons.

The fourth basin serves as a natural habitat for wildlife as it supports ducks, herons, muskrats, turtles, etc. In September 1954, a trial planting of sunfish and bass was made and recent observations have shown the fish to be healthy and growing. The observation of these fish will be continued to check their survival, propagation, and development and it will be necessary to learn the effects of seasonal changes, particularly those of a hot dry summer. To date, the muskrats have caused little damage to the dikes but in some areas and types of soil it would be advisable to bury screen wire in the banks to prevent their tunneling.

Maintenance consists of regular laboratory tests and observations; occasional removal through slotted pipes of the separated oil; and the cutting of weeds. Weed growth has been restricted by the spreading of cinders as a road bed on top of the dikes. These items constitute the only controls while the system operates continuously throughout every hour of the week. It has few disadvantages and many advantages not found in other systems.

Separate sewer systems are provided for sanitary wastes (restrooms, cafeteria), storm water (including cooling water), and process wastes (including plating, surface finishing, washing, spent coolants, oils, etc.). Merely providing the system does not mean necessarily complete and proper segregation but this is accomplished by rigid control of taps to the sewer system. Such taps are required to be approved by the plant engineer and the waste engineer before any actual work begins. This procedure assures also that print changes will be made which may be neglected in some plants, resulting in confusion and expense later.

Table III. Second Basin. Effluent comparison of the first and second basin

	First Basin Effluent	Second Basin Effluent	Per Cent Reduction In Basin	Overall Reduction Both Basins
Temperature (in degrees F)	78.0	68.0	—	——
D.O.—ppm	0.0	0.0	—	——
B.O.D.—ppm	52.0	33.0	9.5	83.7
Turbidity	58.0	62.0	—	——
Suspended Solids—ppm	79.0	51.0	2.0	96.7
Vol. Solids—ppm	61.0	37.0	—	——
Oil—ppm	92.2	45.1	1.8	98.2

Table IV. Third Basin. Effluent comparison of the second and third basin

	Second Basin Effluent	Third Basin Effluent	Per Cent Reduction in Basin	Overall Reduction 3 Basins
Temperature (in degrees F)	68.0	62.0	—	——
D.O.—ppm	0.0	1.2	—	——
B.O.D.—ppm	33.0	19.0	6.9	90.6
Turbidity	62.0	72.0	—	——
Suspended Solids—ppm	51.0	38.0	0.7	97.4
Vol. Solids—ppm	37.0	29.0	—	——
Oil—ppm	45.1	30.4	0.6	98.8

Table V. Fourth Basin. Effluent comparison of the third and fourth basin

	Third Basin Effluent	Fourth Basin Effluent	Per Cent Reduction in Basin	Overall Reduction 4 Basins
Temperature (in degrees F)	62.0	54.0	—	——
D.O.—ppm	1.2	10.5	—	——
B.O.D.—ppm	19.1	4.2	7.3	97.9
Turbidity	72.0	92.0	—	——
Suspended Solids—ppm	38.0	12.0	1.8	99.2
Vol. Solids—ppm	29.0	5.0	—	——
Oil—ppm	30.4	11.5	0.7	99.5

Pipe Sizing Charts

For Use With Low Pressure Steam Heating Systems

By **WILLIAM W. GAYLORD**, Consulting Engineer

THERE APPEARS to be a tendency, due to Code restrictions, to use low pressure heating boilers in systems where the distances from boilers to the heating units are greater than those for which the pipe sizing charts in Fig. 1 (reproduced on this page) of my article* were made.

Because of this, I have prepared new charts (on the following page) for sizing supply and return pipes for these conditions to supplement the older charts.

Many of these low pressure systems use a considerable amount of finned tube radiation and the heat output is often controlled by motor operated valves actuated by modulating thermostats.

Based on such an arrangement, there is little, if any, pressure available at the return end of these units for forcing condensate through the return lines back to the boiler room. To take care of this situation, kindly note that the return lines have been sized on a different basis.

How To Use Charts

These charts can be used for heating systems where pipe length from boiler to the last heating unit is not more than 1000 ft.

The capacities of the pipes are given in square feet of equivalent direct radiation as this is the unit most commonly used for these low pressure systems.

As an illustration of the use of the charts, assume a low pressure steam heating system where the distance from the boiler to the most distant heater is 1000 ft, and that the maximum load on the steam main is 24,000 sq ft of equivalent direct radiation. Also, the main has three branches, each with a load of 6000 sq ft of equivalent direct radiation, and runouts to the heaters require 600 sq ft load capacity.

Required pipe sizes for this assumed system, operating at pressures of 5 lb, 10 lb and 12.5 lb, are presented in table, upper right.

Table indicates pipe sizes for systems operating at 5, 10 and 12.5 lb pressure

Section	Load Sq Ft EDR	5 lb		10 lb		12.5 lb	
		Supply	Return	Supply	Return	Supply	Return
Main to First Branch	24,000	10"	5"	8"	5"	8"	5"
First to Second Branch	18,000	8"	4"	8"	4"	6"	4"
Second to Third Branch	12,000	8"	3½"	6"	3½"	5"	3½"
Third Branch to End	6,000	5"	3"	5"	3"	4"	3"
Runouts to Heaters	600	2½"	1¼"	2"	1¼"	2"	1¼"

These are the charts the author prepared for the first article. Note the abscissa reads from 0 to 150. Ordinate of bottom chart expresses steam flow in pounds per hour; ordinate of top chart indicates condensate flow in pounds per hour

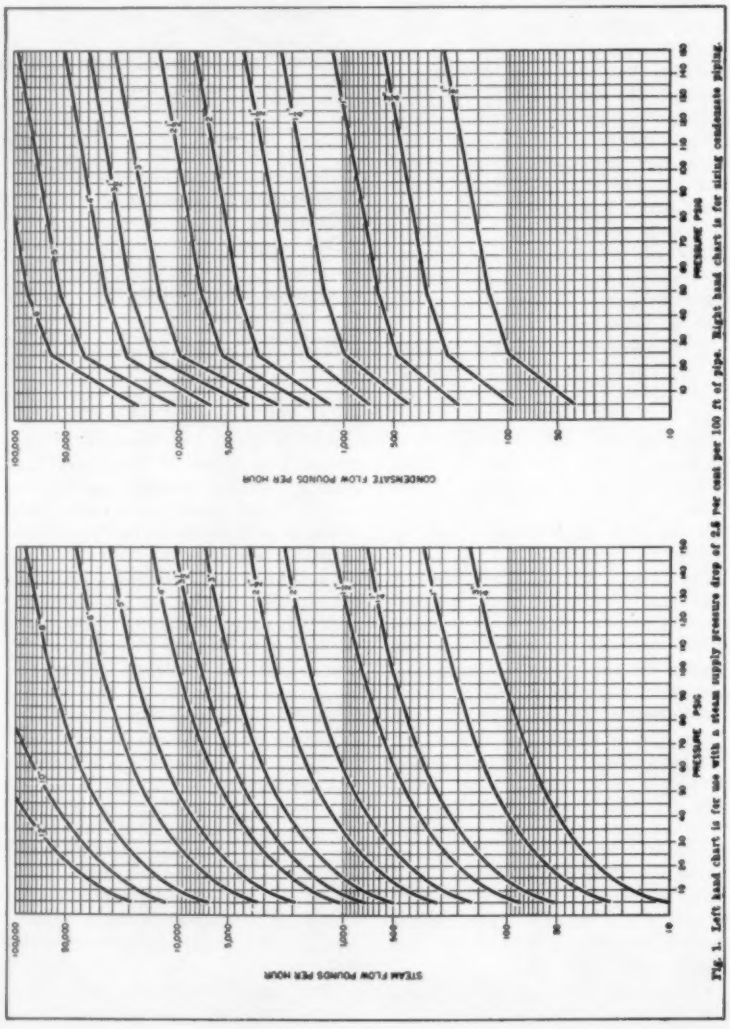

Fig. 1. Left hand chart is for use with a steam supply pressure drop of 2.5 per cent per 100 ft of pipe. Right hand chart is for sizing condensate piping.

* "Quick and Accurate Pipe Sizing Charts" was published in the October, 1953 issue of PLANT ENGINEERING. Some reprints of this article are still available and readers wishing a copy should indicate "Pipe Sizing Chart Reprint" on one of the postcards appearing in this issue.

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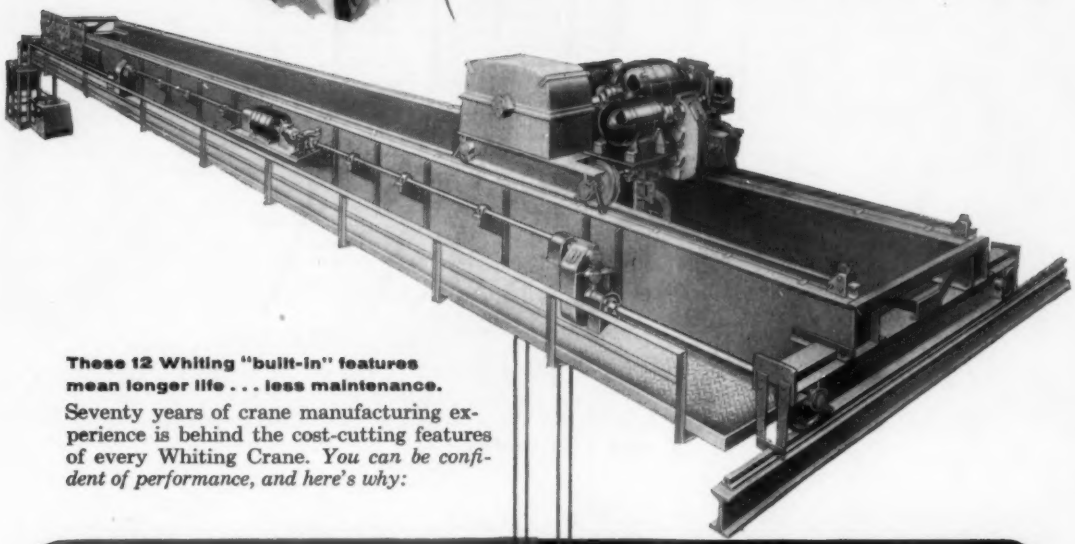

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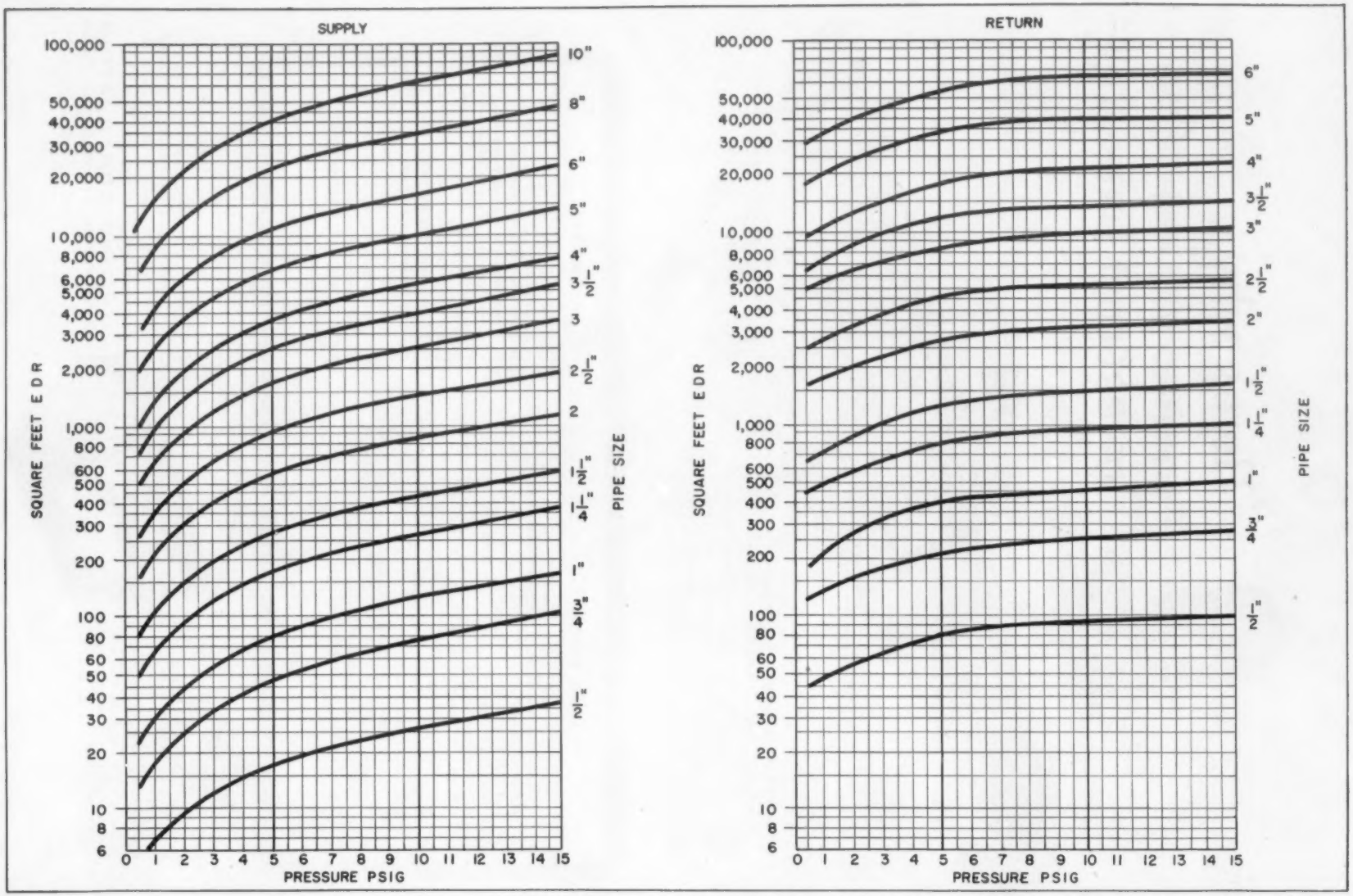
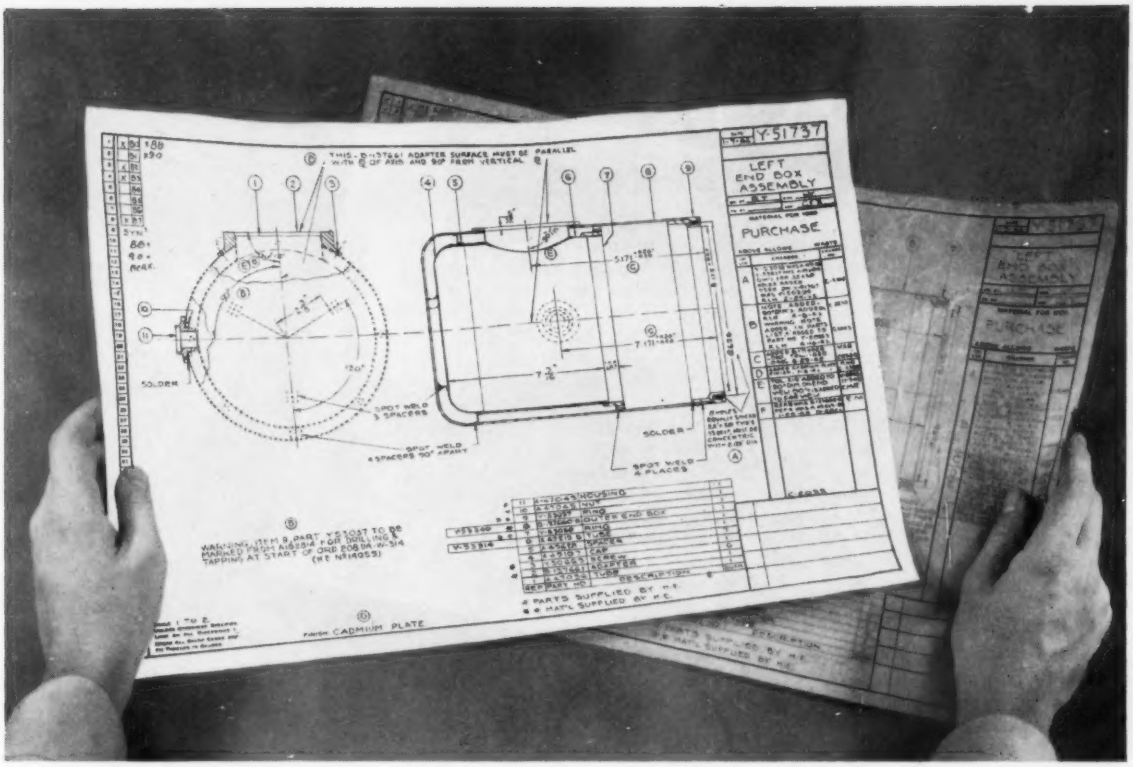


Pipe sizing charts for low pressure systems, based on 2 per cent pressure drop per 100 ft. Abscissa reads from 0 to 15; ordinate is for square feet of equivalent direct radiation



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Hot Meals for Night-Shift Workers

PLANT MANAGEMENT may have found a pepper-upper for production and maintenance workers on the swing and graveyard shift in the Air Force's foil-pack feeding system.

Although developed to give long-mission radar crews hot meals while aloft, the system may well find its way into many a plant. Reason: many plants cannot see their way clear to maintain expensive cafeteria service for small, off-hour work crews. Yet they still would like to provide these men with a hot meal.

Essentially, the foil-pack food service involves pre-shift preparation of meals, uncooked, in aluminum foil containers. Containers, made from Reynolds 3S ½-hard aluminum foil, are placed in a compact refrigerator which can hold food flavor for approximately 72 hours. Comes mealtime, and the containers, their lids tightly crimped, are placed in an equally compact oven. Cooked right in the package, everything from ham and sirloin steak to rolls are ready for eating within 30 minutes—freshly cooked, piping hot, and as tasty as anything on the plant's regular cafeteria menu.

The best part of this frozen-dinner feeding is that the regular plant cafeteria staffers can prepare foilpacks and seal each "course" in separate containers. The cooking is automatic —a bit of pushbutton artistry that turns even the least gifted sandwich maker into a chef. A special oven does the cooking-baking simultaneously right in the foil containers.

While the ham is cooking, the rolls are warming, the cake rising, the vegetables simmering. Every 30 minutes the oven serves up 5 or 6 piping hot meals. By installing two ovens, you can prepare six meals every 15 minutes, providing staggered lunches for staggered shifts. No cooks are needed. Throwaway service makes the nearest trash can the "bus boy." If variety is desired, several choices can be packaged separately, the container's contents inscribed on the aluminum lid.

All this is possible thanks to research by the Air Force's Aero-Medical Laboratories at Dayton, Ohio's Wright-Patterson Air Force Base. Involved are: (1) five small aluminum containers for main courses; (2) a compact oven, 14 in. by 9 in. by 18 in. high; (3) a refrigerator, and (4) various condiments in single service, tear-open packets.

The aluminum container for the meat course measures 3½ in. by 4½ in. by 1½ in. deep. Four smaller containers, 3½ in. by 2 in. by 2½ in. deep, hold a vegetable, a potato item, a brown-and-serve roll, and a dessert.

All are lidded after filling; the lids are crimped by hand (tightly sealed, but not air-tight, to allow expansion during cooking-baking). Meats are usually seared (a short pre-cook) prior to being put into their containers. This adds flavor, and browning allows usually longer-to-cook meat to be adjusted to the baking-cooking cycle of the other courses.

Fig. 1. This compact, 21-lb oven prepares six meals during a 30-min cycle

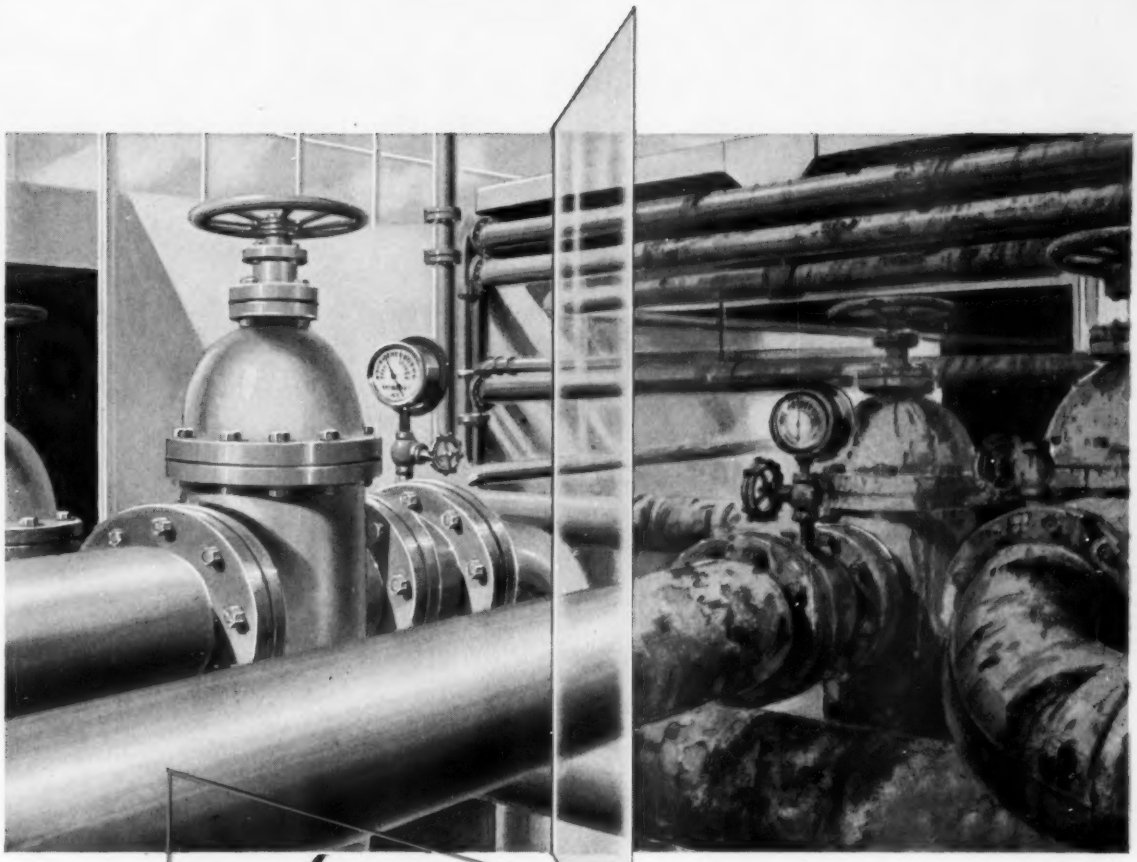
The one "course" which needs least baking—the brown-and-serve roll—is placed in one of the small containers whose bottom is slightly indented, so as to provide a quarter-inch air-space between the container and the oven's heating elements. And that's all there is to it.

The fully-automatic oven, capable of cooking six meals every 30 minutes, is a tray-type unit. Each tray is equipped with a detachable heating element so the trays may be washed without injury to the element. Each tray holds one "meal set." Trays are loaded, the oven door shut, a cycling knob turned and within 15 minutes, the oven reaches its maximum 500 F. At that time, heating elements go off, while the packaged meat simmers for another 15 minutes before the cycle ends.

A tray-type refrigerator (using either dry ice or Freon cooling) holds uncooked but packaged meals up to 72 hours before flavor is compromised. One type refrigerator, made by Tappan Stove Co., holds 90 "meal sets." The oven is a product of Mansfield Aircraft Products Co., Mansfield, Ohio.

Foil-pack feeding is an airborne idea which seems destined to put its feet on the ground—in many industrial plants throughout the country.

Fig. 2. This illustrates how a plant's cafeteria staff might make up foil-pack meals for the night-shift workers on either production or maintenance work



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Essential Features of a Patent

Three Elements of Validity—Novelty, Utility and Invention

By ALBERT WOODRUFF GRAY

WHEN IS A patent a valid patent? To be valid, a patent should have three essential features—novelty, utility and invention. Following are several court rulings which illustrate the invalidity of a patent if one of these three elements is missing.

An action brought for the infringement of a patent of a method for manufacturing expanded metal came before a United States appellate court. The infringer of the patent contended in his defense that the patent was not valid as patents had been granted over forty years before on methods for removing the rough edges and burrs and smoothing the diamond shaped openings of expanded metal.

The court, in its decision, said the patent was not valid under these circumstances and consequently that there was no infringement, named the three essentials for any valid mechanical patent, "It is necessary to recall that three elements are essential to validity — novelty, utility and invention." Here for lack of the first the patent was worthless.

The statement made by the court in this instance is a summary of the present statute which provides,

"Whoever invents or discovers any new and useful process, machine or manufacture or composition of matter or any new and useful improvement thereof, may obtain a patent therefor subject to the conditions and requirements of this title."

Under the statute, whatever is an invention and is new and is useful may be protected by a patent but lacking any one of these features, the patent, even if granted, will not endure.

Novelty

In a discussion of the essential of novelty, the question was posed by a court, whether the invention of an arm for pushing fuel through a trough under a furnace fire box was any problem that might not be readily solved by a skilled mechanic.

The so-called invention, in the opinion of the court, was the same method used in extension tables, fire ladders, or collapsible telescopes and lacked this essential of novelty.

This same difficulty was met by another applicant for a patent for a combination drill and countersinking tool. The Federal Court, in denying this inventor the right to a recovery for what he claimed to be an infringement of the patent, made the comment that an adjustable stop for limiting the penetration of a drill had been known and used long before this patent application had been filed.

The inventor in this instance, according to the court, had taken old and well known tools and used them to a new purpose. There was nothing new either in the tools or the method, nor was there anything new either in the device or in its attainment except that the tools were used on new material.

Utility

The second necessary feature, utility, was involved in a recent infringement suit by a razor blade manufacturer. A patent had been issued for the manufacturer of blue razor blades. Suit was brought when blue razor blades were marketed by a competitor of the manufacturer. This competitor, in his defense, argued that under the patent law no greater utility attended a blue razor blade than razor blades of any other hue or shade.

The Federal Court, in its decision that here was no patent on which could be asserted a claim for infringement, said that while a patent for a special make or anything new possessed great advertising value, and that while there was an old and deep-seated belief that blue tinged cutting steel was superior, there was, nevertheless, no real utility in blue razor blades greater than in blades of any other color.

The same court, in a later decision, summarized the meaning of this patent feature of utility as, "The test of patentable utility is practical usefulness and a machine is not useful if it merely accomplishes a purpose only to such a restricted sense as to make its use in industry prohibitive."

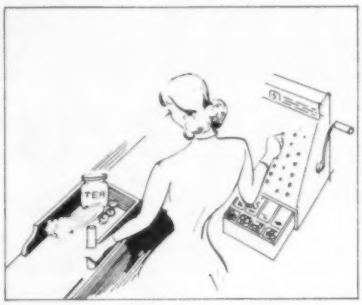
A recent infringement action before the Supreme Court involved a patent on a three-sided pusher or tray, used in self service grocery stores. With the counter serving as the bottom, the tray, held in position by side rails, was employed in pushing customers' groceries to the cashier for checking. It is then shoved back to the end of the counter for the next customer's groceries.

A large chain self-service store adopted this device and was met by an infringement suit as a consequence. In its defense, the store contended that the patent lacked the third of these essentials—invention.

Invention

The patent for this "pusher" however, was sustained by the lower court. That decision was appealed and the decision affirmed by the Federal Court of Appeals. One of the judges in this court disagreed, saying that the patentee had merely opened the apex of the ordinary pool ball triangle rack so that the legs of the triangle were parallel to each other and perpendicular to the base, that this open rack hand pushed along a table top was neither automatic nor even mechanical.

The store chain again appealed, this time to the Supreme Court of the



United States. The opinion of one of the justices of that court, concurring in the decision that this patented pusher entirely lacked this essential of invention and the patent was therefore void, said,

"Every patent is the grant of a privilege of exacting tolls from the public. The invention to justify a patent had to serve the ends of science —to push back the frontiers of chemistry, physics and the like, to make a distinctive contribution to scientific knowledge."

REFERENCES

U. S. Gypsum Co. v. Consolidated Expanded Metal Companies, 130 Fed. 2d 888
35 U.S.C.A. sec. 101
Detroit Stoker Co. v. Brownell Co., 89 Fed. 2d 422
Wright v. Thermoid Rubber Co., 28 Fed. 2d 651
Cleveland Punch & Shear Co. v. Bliss, 145 Fed. 2nd 991
Great Atlantic & Pacific Tea Co. v. Supermarket Corp., 340 U.S. 147

COMPLETE LINES OF WALWORTH VALVES for POWER PLANT SERVICE

Featuring Walworth Pressure-Seal Valves

Here are cast steel valves built for high-pressure, high-temperature service. The unique bonnet-to-body design utilizes internal line pressure for a tight, leakproof connection. The higher the pressure the tighter the bonnet joint! Bulky, heavy bonnet flanges, bonnet studs, and nuts are completely eliminated providing a modern valve design of truly streamlined proportions. Maintenance is simplified as Walworth Pressure-Seal Valves are easily assembled, disassembled, and insulated.

Walworth Pressure-Seal Valves are available in Series 600, 900, 1500, 2500, and in a wide range of sizes and types. Complete information is available from your nearby Walworth Distributor—or—write Walworth for for a free copy of Circular 16.

and including these valves for "*'round-the-plant*" use!

WALWORTH SMALL CAST STEEL Y-GLOBE VALVES. Simplified design eliminates many of the problems encountered in high-temperature, high-pressure service. No bonnet joint. Improved back-seat design means longer life for packing rings.

WALWORTH LUBRICATED PLUG VALUES. Easy turning—quick operating. Lubricant can be renewed while the valve is in service. Lubricant completely surrounds the plug ports for a tight seal against leaks. Remember, always use Walworth Lubricant in Walworth Lubricated Plug Valves.

WALWORTH BRONZE VALVES. Standardized lines of bronze valves provide an unsurpassed system of interchangeability of parts, drastically reducing inventory problems. Walseal Valves with brazing ends also available in a variety of types.

WALWORTH IRON BODY GATE VALVES. Straight-flow port design reduces fluid turbulence to a practical minimum. Seat rings of end-seated type are screwed into the body. Brass liner on glands assures greater resistance to corrosion and scoring. Available with threaded or flanged ends.

WALWORTH CAST STEEL GATE VALVES. Bolted bonnet, wedge gate, OS&Y. Bonnets and bodies are engineered to withstand pressure and minimize distortion. Heavy steel walls provide extra strength and longer life. Deep stuffing boxes in all sizes (2" to 24") insure tightness and maximum packing life. Also available in globe and angle types.

WALWORTH also offers Plastic Valves, Fittings, *and* Pipe of polyvinyl chloride, moulded to Walworth's specifications by General American Transportation Company of B. F. Goodrich Chemical Company Geon!

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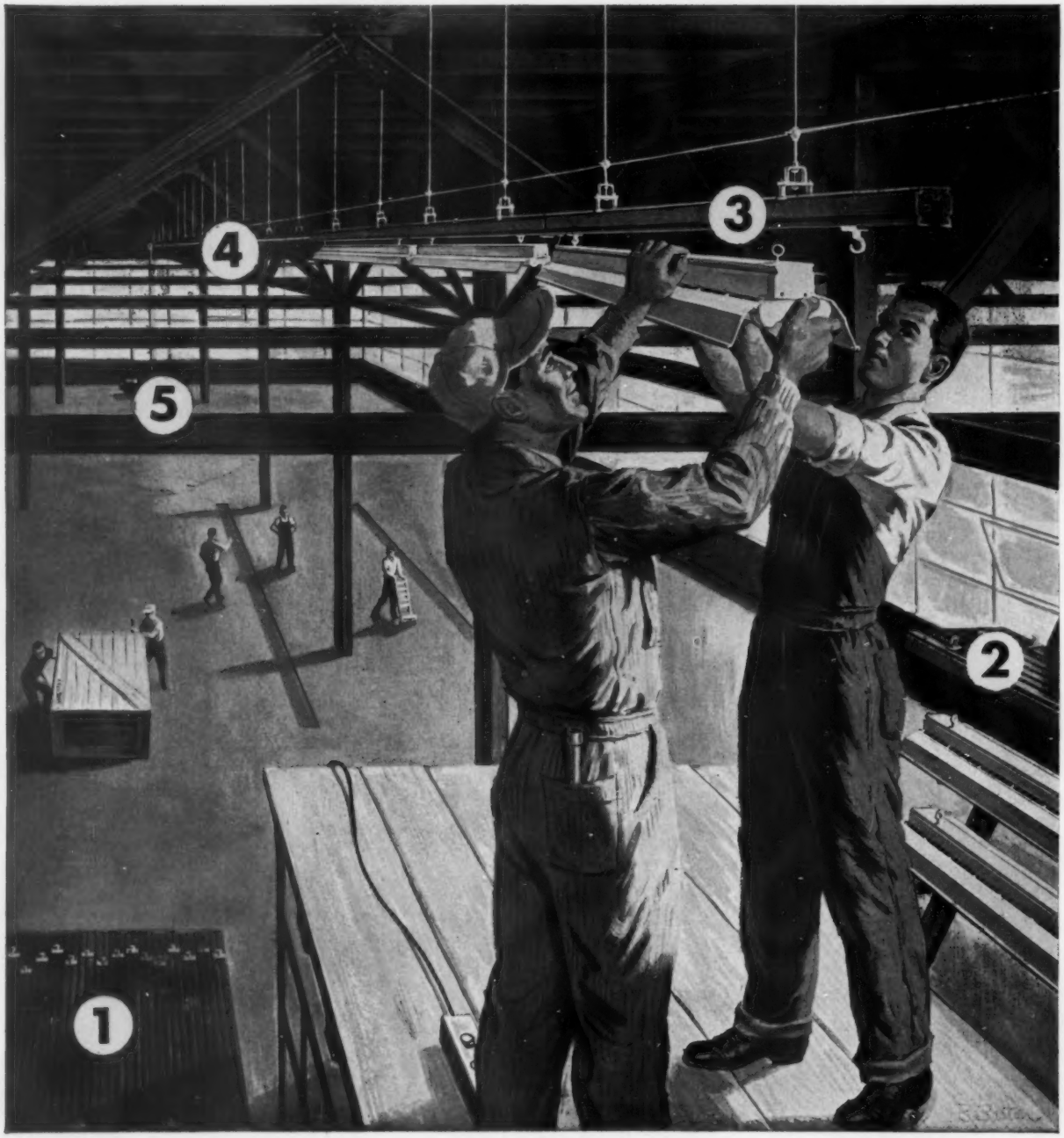
Walworth Company of Canada, Ltd., Toronto

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

For more facts circle 569 on Reply Card

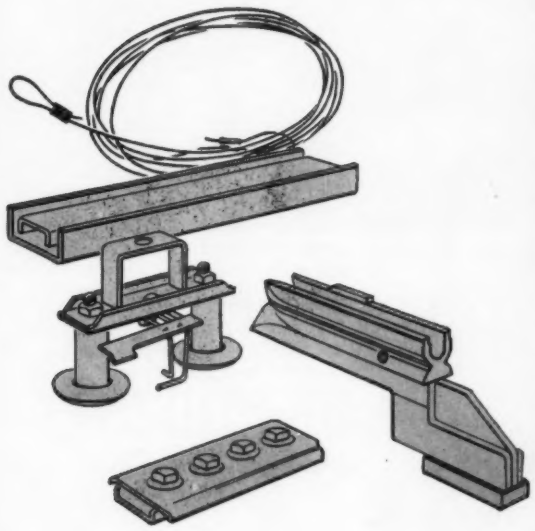
General Electric announces Roll-in Busway technique

Hang busway and fixtures from one then watch installation

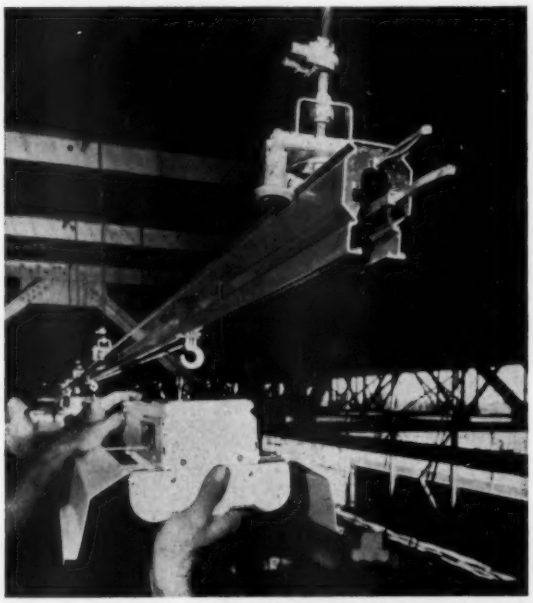


location at one time, roll into place, costs drop 30% to 50%!

1 G-E lighting busway and fluorescent fixtures are assembled on floor. **2** Hoist raises material to work platform. **3** Successive busway sections are placed in hangers and joined. At the same time, fluorescent fixtures are hung from and plugged into the busway. **4** Cable and **5** winch at far end of building pull busway with fixtures through roller-type hangers until the entire system is in place. On several major lighting jobs, G-E busway and closely spaced fixtures have been rolled in at a rate of five feet per minute, or twice the speed normally taken for hanging fixtures alone!



There are only five additional—and minor—parts needed to install General Electric Type LTG lighting busway by the new system. The longer the busway run, the greater will be the installation savings. For complete data, see your nearest G-E representative or write, **General Electric, Distribution Assemblies Dept., Plainville, Conn.**



The busway moves—not the work platform. As each busway section with fixtures attached is hooked up to the preceding section, it is pulled through new roller-type hangers until the entire run is finally in place. The system ends the need for the usual repeated relocation of platforms and other equipment. It allows both the busway and the fixtures to be installed before permanent flooring is laid or machinery put in place, and avoids interference with other plant activities.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 570 on Reply Card

NEW PLANT CONSTRUCTION — advance information on location, costs

Corona, Calif.—Gladding McBean Co., 1275 Harrison St., San Francisco, Calif., has announced a major capital expansion, modernization, mechanization and research program approximating an outlay of $8 million. Plans include a vitrified clay pipe plant now under construction near here. New 200,000 sq ft one-story structure will produce vitrified clay pipe in sizes from 4 to 39 in. and multiple-duct vitrified clay pipe for telephone and cable installations. New building will represent an investment of $5 million, and the remaining $3 million will go toward improvements in other company facilities.

Pittsburg, Calif.—Dow Chemical Co., 1000 Main St., Midland, Mich., has announced an expansion program in the production capacity of caustic potash at local plant here. New work will triple present production capacity of the chemical used chiefly by the soap detergent and oil industries. The expansion, now under way, is scheduled for completion in early 1957. Cost reported to be in excess of $1 million.

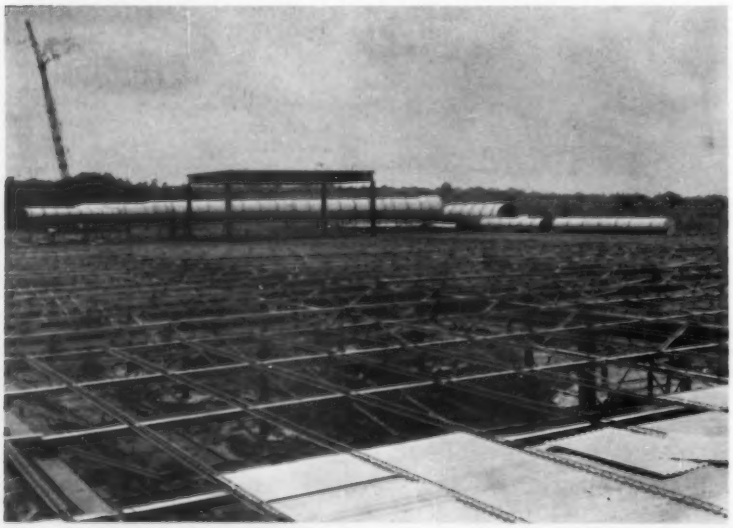
West Hartford, Conn.—Pratt & Whitney Co., 1 Charter Oak Blvd., has acquired a 7000-acre tract of land just east of Lake Okeechobee, in Palm Beach County. Construction will begin soon on a jet engine manufacturing plant and testing center. Plant with equipment will cost an estimated $42 million.

Atlanta, Ga.—Zep Manufacturing Corp., 560 Edgewood Ave., N. E., manufacturer of sanitary and maintenance chemicals, plans to construct a new manufacturing plant and technical laboratory. New building when equipped will represent a cost of $750,000.

East Point, Ga.—Borden Co., 350 Madison Ave., New York, N. Y., is constructing a new plant to serve as a refrigerated biscuit and cheese warehouse, on local site here. New plant will have an initial floor area of 67,000 sq ft with provision for future expansion. Building will include provision for office and administrative workers and will also consolidate company's biscuit plant at 1200 Chattahoochee Ave., N. W., with the present cheese warehouse located at 718 Bull St. Cost of construction and equipment will be approximately $1 million.

North Judson, Ind.—Flintkote Co., 4126 RCA Bldg., New York 20, N. Y., plans to construct a new plant to serve company's midwest market and to meet increasing demand for the building slab product. New plant will be constructed on 30-acre site, 65 miles southeast of company's Chicago Heights plant. New plant will cost more than $1 million and is expected to be in production by mid-1957.

Chicago, Ill.—Acme Steel Co., 2836 Archer Ave., this city, plans to build a new manufacturing plant for the production of semi-finished billets and slabs in Chicago's Calumet Harbor area. Plant will have a monthly capacity of 17,000 tons of billets and slabs. Construction of the new mill will begin soon and will go into production by 1959. New construction and mill will cost an estimated $15 million.



The dust-collector system is being installed above the roof rafters of the new plant of Eberhard Faber Pencil Co. near Wilkes-Barre, Pa. The company will move into this one-level, seven-acre plant located on a 38-acre site early next year

Humboldt, Kan.—Monarch Cement Co., has announced plans for a major expansion program to increase plant capacity by more than 50 per cent. Output will be increased from 1.5 million bbl annually to more than 2.3 million bbl. A new crushing plant to be installed will process 450 tons of limestone per hour. This expansion program will cost an estimated $6.5 million. MacDonald Engineering Co., Chicago, Ill., is the general contractor.

Destrehan, La.—Standard Oil Co. (Indiana), plans to construct a third polybutene plant. New unit will be built by a subsidiary company, Pan-Am Southern Corp., at Pan-Am's refinery here. Polybutenes are synthetic liquid hydro-carbons used in adhesive, caulking and sealing compounds. Company itself uses polybutenes in the manufacture of special additives for automotive lubricating oils and new plant will provide additional production for Standard's expanding consumption.

Breckenridge, Minn.—Spencer Kellogg & Sons, Inc., 100 Delaware Ave., Buffalo 5, N. Y., has plans under consideration for the construction of a new soybean and flaxseed processing plant on a 110-acre site, near here. Work will not get under way until spring of 1957 depending on company's research to determine the most suitable process of extraction to be used at the new plant. A 2.5 million bu elevator is planned. Cost of new facility will approximate $5 million.

Perth Amboy, N. J.—American Smelting & Refining Co., 19 Nassau St., New York, N. Y., plans to expand its local facilities for continuously casting bronze foundry alloys. Work will begin soon to increase plant capacity by approximately 50 per cent. Installation of two continuous casting furnaces are planned in the enlarged structure. Cost estimated in excess of $1.2 million.

Buffalo, N. Y.—Ashland Oil & Refining Co., Ashland, Ky., has authorized plans for the construction of a new plant for the production of aromatics and other auxiliary equipment at local 30,000 bbl a day refinery of its Frontier Oil Refining Co., division here. New aromatics plant will have a capacity of 21 million gal annually or approximately 1370 bbl per day of benzene, toluene, xylene and other petrochemicals. Construction of new facility will begin at once with completion scheduled for late 1957.

Massena, N. Y.—Reynolds Metals Co., Reynolds Metals Bldg., Richmond 18, Va., has acquired tract of land approximating 1,500 acres on which it proposes to build an aluminum reduction plant. Plans will include an aluminum

(Continued on page 214)

Cork Collector—Dracco Dust Filters at Mundet Cork Corp., assure cost savings, clean plant and clear skies. Multi-Bag Filters recover cork dust from cyclones and silos, exhaust dust-free air.

JOSEPH H. CONERLY, PLANT SUPERINTENDENT, MUNDET CORK CORP., REPORTS:

Dracco dust control halts cork loss, results in major cost savings

"Dracco Dust Control equipment now saves us thousands of dollars annually," estimates Joseph H. Conerly, plant superintendent, Mundet Cork Corp., Hillside, N. J. "In addition, it has eliminated a serious fire hazard and improved plant and worker efficiency."

Manufacture of Mundet's broad line of cork products involves many dust-producing operations—reduction, grinding, milling, sawing, squaring. Fine cork dust, formerly exhausted to the atmosphere from cyclones, is now captured by the extensive Dracco system.

With Dracco units on duty at Mundet, previous dust disposal costs and fuel costs have been reduced substantially. Waste cork granules are burned for heat, reusable material is reclaimed. This profit-producing Dracco installation was custom-engineered to Mundet requirements, operates at a high rate of efficiency.

This is another case where Dracco experience converted a dust problem to dust profits. A Dracco engineer will be glad to show you how dust control can mean savings for your plant. Call or write today.

DRACCO CORPORATION

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Bulletin 800 is Dracco's 40-page catalog on dust control and recovery. Contains detailed facts and figures on all dust control equipment. For your copy, write Dracco today.

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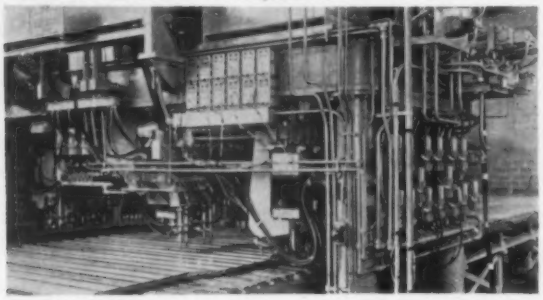
Airstream **CONVEYORS · DUST CONTROL EQUIPMENT**

For more facts circle 571 on Reply Card

Automatic Welding Machine Produces Truck Trailers, One Side at a Time

IN THE ENGINEERING and manufacture of an over-the-road trailer, the problem of building the side walls and roof of the unit is not a simple one.



In the manufacture of the Fruehauf high-tensile corrugated steel trailer body, a special Link welding machine, not duplicated in any other industry, had to be designed to do the job correctly.

With the machine, an entire trailer sidewall is preassembled on the table, the pieces fitted to the exact size of the finished sidewall. Then the machine takes over. Automatically, the entire assembly is welded, with each weld being placed on the exact spot it is designed to be, accurately timed as well as accurately located. The trailer side is moved along piece by piece until the job is completed.

Incorporated in the mechanism of the machine, which produces an extremely rigid construction in the trailer side, are controls actuated electronically, electrically and hydraulically.

Foundry Stirs Hot Metal with Electric Current; No Spoons Needed

INDUCTION STIRRER mechanisms will soon be employed in the General Electric Company's Schenectady steel foundry to produce better alloyed steel castings. Previously, all induction stirrers used in the metals trade throughout the world were used for the production of steel ingots, and this is the first such installation in a foundry.

A Swedish invention, the use of induction stirrers decreases the time necessary for refining steel prior to pouring and produces a better quality of steel for casting.

The static condition of molten metal baths, during their refining in an electric arc furnace, slows down the metallurgical reactions. Alloying elements tend to stratify, and temperature distribution is not even.

The induction stirrer device is a water-cooled coil resembling a segment of the stator of a large two-phase induction motor. The coils are encased in a steel container, which is curved to fit the furnace contour. The coil itself will be suspended about one inch below the stainless steel furnace bottom.

Flow pattern in the metal is achieved by the two-phase winding being excited by alternating currents of low frequency electricity. The traveling magnetic field induces eddy currents in the metal, and the magnetic field associated with these eddy currents reacts with the excitation field.

The result is a stirring force which moves the metal in the furnace across the hearth bottom, upward and sideways in conformity to its hemispherical shape.

The moving magnetic field generated by the current flowing in the stirrer coils may be caused to move in either of two opposite directions—the flow of metal may be directed up at the spout for pouring, or up at the slag door for slag-off operations.

Safety Precautions Highlight New Nuclear Criticality Facility

EXPERIMENTAL REACTOR studies, to check calculations against actual reactor performance, will be performed at a new Criticality Facility constructed by Alco Products, Inc.

Primary studies at the facility will be in connection with Alco's contract to build the Army Package Power Reactor—a 2,000-kw pressurized water nuclear generating plant now being built at Fort Belvoir, Va.

In operating the facility, priority will go to protecting the worker and the public from potentially hazardous radiation. Health physicists, detection meters, film badges and detailed records are all part of the elaborate safeguards used to insure that employees and the public never get exposed to radiation beyond maximum prescribed limits.

Filters in the ventilating system will remove more than 99 per cent of any radioactive particles before the air leaves the stack. Constant monitoring will be applied to the air effluent, as well as to the water discharged into the Mohawk River, near the Schenectady, N. Y. plant site.

The Alco facility includes a two-story reinforced concrete reactor room, together with a control room, "counting room" and administrative offices, all in a one-story extension.

A GOOD MAN TO KNOW FOR INDUSTRIAL LUBRICATION

No service is better than the men behind it. That's why Atlantic lubrication consultants, such as the man you see in the illustration, are experienced men with years of on-the-job knowledge of heavy industrial lubrication requirements.

These men are also representative of the men behind the service you can expect from Atlantic. Atlantic is made up of many specialists — men skilled in research, production, transportation and marketing of petroleum products from lubricants and gasolines to petrochemicals.

Behind their skills are 85 years of developing successful products for the use of our customers. Atlantic has pioneered in many historic firsts in the petroleum industry. To judge for yourself the value of Atlantic service, write, wire or phone the Atlantic office nearest you for full information on Atlantic lubricants for heavy industrial installation. The Atlantic Refining Company, Dept. M11, 260 South Broad Street, Philadelphia 1, Pa.

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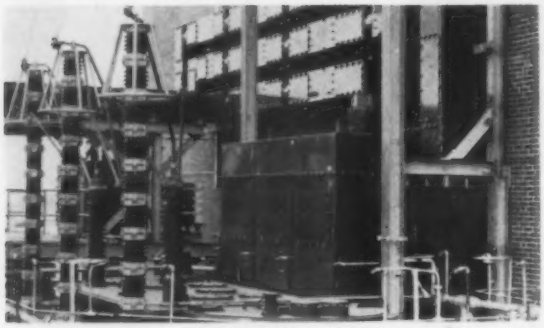
PITTSBURGH, PA.
Chamber of Commerce Bldg.

For more facts circle 572 on Reply Card

Forced Air Cooling for Aluminum Bus in New Generating Station



FORCED AIR COOLING for isolated phase bus has been introduced into the electrical distribution field at the Cleveland Electric Illuminating Company's new Eastlake plant.

The aluminum bus used at the station was manufactured by General Electric, and is rated at 10,000 amperes—believed to be the first of that capacity ever built.

Forced air cooling permits the use of bus only 30 in. square, and this comparatively small size offers economic and space-saving advantages over bus of larger size.

Air is blown into the center phase of the system at a point directly under the generator terminals, and it travels the entire length of the duct to the main transformer. The flow is then diverted, by baffles, to outside phases and returns to the starting point.

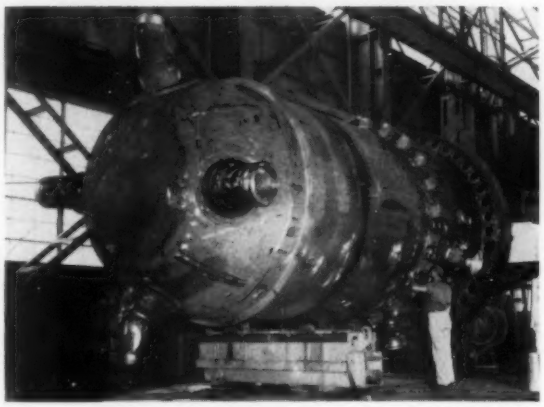
Atomic Power Generator Needs Big Equipment, and This Is the Biggest Piece

THE HEAVIEST SINGLE COMPONENT for America's first full-scale commercial nuclear power plant, the shell of the 235-ton reactor vessel, was fabricated at the Chattanooga, Tenn., plant of Combustion Engineering, Inc. The vessel will be installed at Shippingport, Penna., in an electric generating plant which Westinghouse Electric Corp. is designing under contract with the AEC, for operation by Duquesne Light Company.

It was built by assembling sections of the heaviest clad plate ever rolled by Lukens Steel Co., using special welding, machining and heat treating techniques developed at Combustion's Chattanooga plant. Initial net electric output of the Shippingport power plant will be 60,000 kw, but the turbine-generator will have a capability of 100,000 kw, in anticipation of greater nuclear capacity in the future.

The reactor vessel is designed to withstand a 2500-psig internal pressure at 600 F. At rated load, 26 million lb of primary coolant water will enter the vessel each hour, through four inlet nozzles and pass through the core, where the temperature will be raised from 507 F to 542 F.

Dry weight of the vessel is 235 tons, of which the shell portion alone makes up 150 tons, the removable top head 85 tons. Thermal shields, a core assembly and other equipment having a total weight of 100 tons make up the interior of the shell. The internal diameter is 9 ft, 1 in.



and the length from the inside of the lower head to the inside of the top head is 31 ft, 3 in.

Internal portions of the vessel are clad with a ¼-in. minimum thickness of stainless steel, to prevent corrosion of the metal by the coolant. Basic material in the vessel is manganese-molybdenum steel, with minimum tensile of 80,000 psi, and the cladding is AISI Type 304-L.

Water Treatment Plant Purifies Water Three Ways for Refinery Use

WITH ENOUGH CAPACITY to serve a city of 200,000 persons, a water treatment plant has started operation as the first completed unit at Tidewater Oil Company's new refinery, south of Wilmington, Delaware. The plant started up before other units of the refinery, in order to provide water for the testing and preliminary operation of other refinery units as they are completed.

When the refinery is operating, the treatment plant will provide water for a multitude of plant uses. Capable of processing up to 3200 gpm, the treatment plant is entirely separate from the refinery cooling system, which uses 275,000 gpm of Delaware River water to cool refinery units.

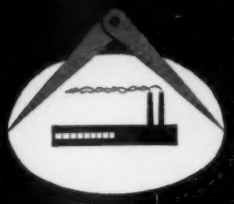
Three methods of water purification will be used, each to produce water for a different purpose. First, pre-treatment, will purify water by filtering and chemical processing for use as drinking water. Second, demineralizing will provide water pure enough for use in the power plant's steam boilers. Third, a zeolite process, will produce a chemically softened water for use in various stages of the refining process.

Included in the equipment in the treatment plant are three main pumps, two with a capacity of 4000 gpm each, and the third rated at 6000 gpm.

Using

DU PONT ELASTOMERS

NEOPRENE • HYPALON®



in Industry

Products of colored HYPALON® stay bright despite severe exposure

TWO YEARS of outdoor exposure with virtually no trace of color failure, thanks to the superior color stability of HYPALON.

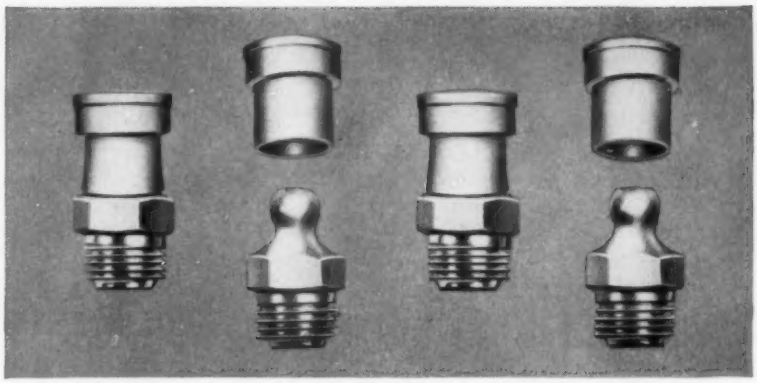
HYPALON, Du Pont's new synthetic rubber, is best known for its exceptional resistance to heat, ozone and oxidizing chemicals. But another advantage is its color stability.

HYPALON can be compounded in a *complete range* of weather-resistant colors that keep their brightness despite severe indoor or outdoor service.

Rubber, wood, metal and masonry can be decorated as well as protected by coatings of HYPALON. Colorful compounds of HYPALON can also be used as the jacketing on heater cords, wire and cable where ozone may be a problem. Tarpaulins of HYPALON-coated fabrics can be made in any color and give excellent resistance to sun, weather and oxidizing chemicals.

The use of colored HYPALON in your plant can mean long-term economy. So when you need a resilient colored product that must have *exceptional* resistance to heat, ozone and oxidizing chemicals, remember HYPALON.

For more facts circle 574 on Reply Card



NEOPRENE grease caps eliminate a main source of bearing failure

Protect fittings from dirt

A midwestern manufacturer of lubricating caps has reported the development of snap-on caps made of neoprene, which are said to eliminate one of the main sources of bearing failure—the introduction of dirt into bearings at the time of greasing. Dirt ordinarily accumulates on the fittings and is forced into the bearing when it is greased. Capped fittings are protected from such dirt pickup, so there is no problem.

Neoprene chosen over natural rubber, plastics, paper

During the development of the snap-on cap, natural rubber was ruled out because it swelled and stuck to the fitting when exposed to grease. The various plastic caps tested became slippery and fell off the fitting. Paper did not have the elasticity needed. Neoprene finally was chosen because it has the elasticity and resilience needed for the cap to stay on the fitting plus the resistance to grease to keep it from swelling and sticking.

Color-coded fittings

Neoprene caps also come in a range of colors, which can be used to set up a lubrication schedule, to indicate the type of lubricant needed and to locate inaccessible fittings.

Other properties and products of neoprene

Lubricating caps are just one example of how the properties of neoprene can be used in plant maintenance. In addition to its resistance to oil, neoprene also resists chemicals, heat, abrasion, weather and sunlight. It is the balanced combination of these properties that makes neoprene well suited for use in gaskets, hose, belts, coatings and many other products. For more information on how neoprene reduces maintenance and replacement costs, use the coupon below.

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HYPALON *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Please send further information and add my name to the mailing list for your free publications, the "Neoprene Notebook" and "Facts about HYPALON®," which show how the Du Pont elastomers are used in designing new products, improving old. I am particularly interested in

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Elastomers Division, Dept. PL-11
Wilmington 98, Delaware

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Firm_____

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Typical plant ceiling showing foil-faced Pittsburgh Fiber Glass insulation in position.

"Pittsburgh Superfine is easiest to apply... most efficient insulation for steel buildings"

SAYS MR. CHARLES W. JACKSON, *President of Quonco, Inc., fabricated steel building sales and erection firm of Indianapolis, Ind.*

Experience has taught Quonco, Inc., that it takes more than conventional material to properly insulate a fabricated steel building. First of all, the material must be self-supporting and preferably blanket-type. It must be lightweight and very easy to handle. Further, it must be extremely efficient in insulating against heat loss and absorbing noise.

Quonco found all of these insulation advantages in one product—Pittsburgh Superfine Fiber Glass. Mr. Jackson, President of the Indianapolis firm, sums up the advantages this way: "Since Pittsburgh Superfine in our buildings reduces heat loss to only ⅓ that of conventional masonry buildings, our customers can plan for a lower initial investment in heating equipment and cut their estimated fuel costs considerably." As an example, Mr. Jackson cites the case of the world's largest fabricated steel building—7½ acres—in which 300,000 sq. ft. of Pittsburgh Superfine was used. Only one of the plant's three boilers, and 7 of the plant's 12 air supply units is needed to maintain a comfortable 75° for over 3000 employees. Even during hot summer months, temperatures are 10° to 15° cooler inside without air conditioning.

If plant and office modernization or construction is part of your current plans, be sure to know about the unusual features and savings that Pittsburgh Superfine insulation can provide you. For your copy of Bulletins F-100 and F-140, write Fiber Glass Division, Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh 22, Pa. For immediate service on your specific problem, you can call the nearest Fiber Glass Division sales office listed below.

PITTSBURGH SUPERFINE FIBER GLASS IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

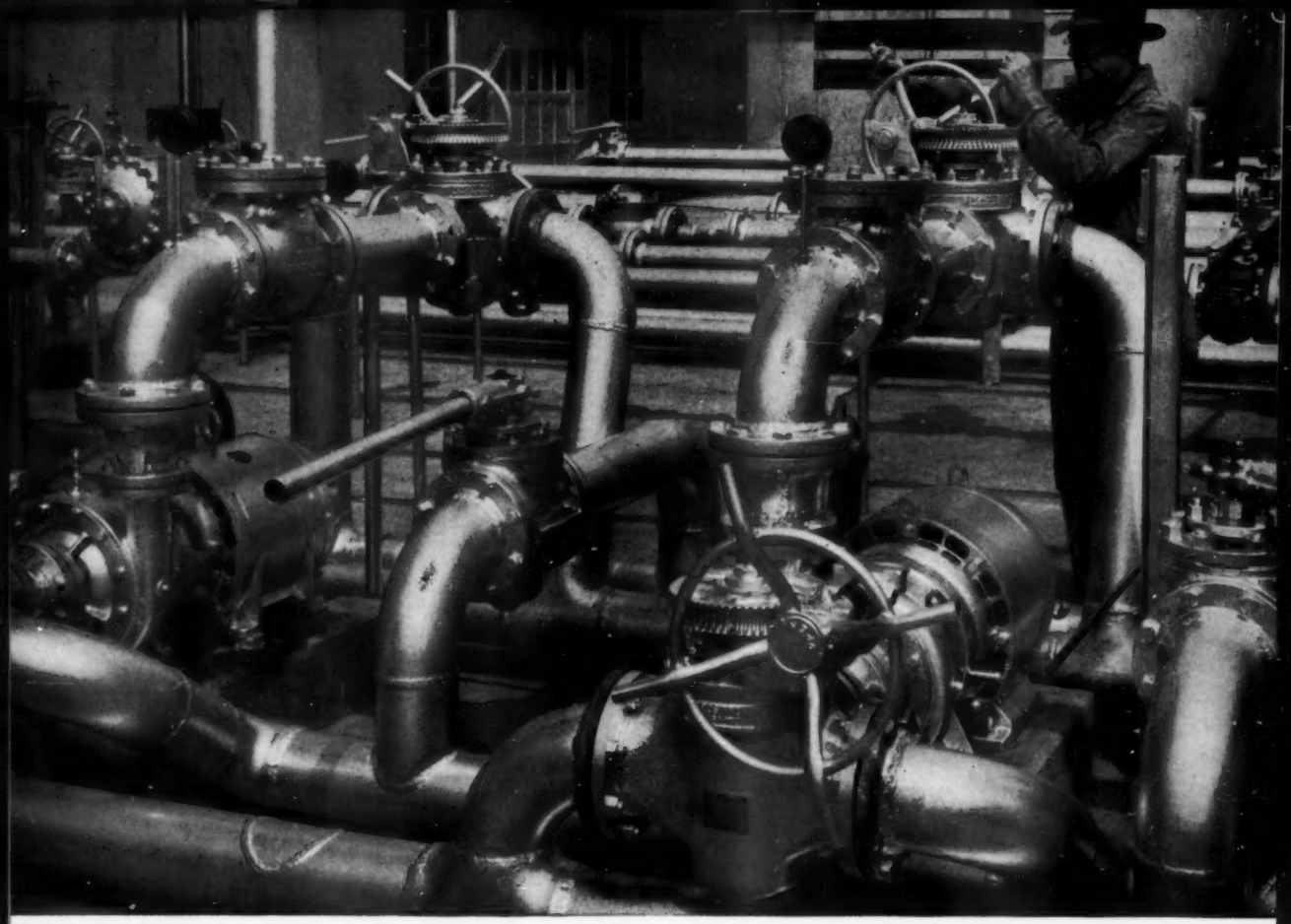
Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, and St. Louis

FIBER GLASS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

For more facts circle 573 on Reply Card



How To Get Tight Shut-off

For tightest shut-off, Rockwell-Nordstrom valves can't be matched by any other valve. Why? Pressurized lubricant forms a continuous, plastic seal around the seat ports for positive shut-off at all times. And Rockwell-Nordstrom valves *stay* leakproof because seating surfaces are *never* exposed to cutting or corrosion by line fluids. They operate easier and smoother, too. In just a quarter-turn, the plug glides freely on a film of lubricant for full opening or closure.

Rockwell-Nordstrom valves cost no more to buy (often less) than ordinary valves. And they cost far less to *use* on any service. Lubricant *keeps* working parts good as new for years. Result: better performance, longer life and lower costs.

Rockwell-Nordstrom valves are available in sizes from ½" to 30" and pressure ratings to 10,000 lb. WOG. You can select from semi-steel, steel, stainless and other corrosion resisting metal patterns to meet your every need. See your nearest industrial supplier or send coupon for complete information. Rockwell Manufacturing Company, Pittsburgh 8, Pa. *Canadian Valve Licensee:* Peacock Brothers, Limited.

ROCKWELL-
Nordstrom
VALVES

Lubricant Sealed For Positive Shut-Off

40th YEAR *of lubricated plug valve leadership*

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Rockwell Manufacturing Company
Pittsburgh 8, Pennsylvania

☐ Please send me Bulletin V-215
☐ Please send me name of nearest Rockwell-Nordstrom industrial distributor.

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Company_____

City_____ Zone____ State_____

use steam efficiently, economically—choose the trap with . . .

top quality...

to keep it on the job

No need for a steam trap to be complicated. All it does is discharge condensate and air from steam lines and equipment. But its importance shouldn't be overlooked. On its effectiveness can rest your economical use of steam . . . the efficiency of your process operations.

A steam trap has to be built to serve long and dependably in severe service—and that's where Nicholson quality counts heavily in terms of performance.

- **One moving part**
- **Positive shutoff—no steam waste**
- **Powerful, intermittent valve action**
- **High capacity—effective use of large orifice**

Specify Nicholson, and be sure.

Write for new
Bulletin 10-55

NICHOLSON

W. H. NICHOLSON and Company

TRAPS • VALVES • FLOATS • METAL PARTITIONS
LAUNDRY, DRY CLEANING AND PRESSING MACHINERY

14 OREGON STREET, WILKES-BARRE, PA. • SALES AND ENGINEERING OFFICES IN 98 PRINCIPAL CITIES

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Most power per dollar of any drill !

Back by popular demand!
Black & Decker 1/4" Standard

HOLGUN

(CODE No. 345)

1. Lowest-priced drill in its class!
2. Wear-resisting ball bearings.
3. Compact and lightweight—reduces operator fatigue.
4. No stalling under heavy loads.
5. Belongs to world's best-known drill line.

The new model Black & Decker 1/4" Standard Holgun combines lightness and power. It's your ideal tool for a raft of drilling jobs. Powered by a B&D-built motor, it has stamina to spare. Rugged construction gives you years of trouble-free service.

See your B&D distributor today or write: The BLACK & DECKER MFG. Co., Dept. 1511, Towson 4, Md.

Look in the Yellow Pages under "Tools—Electric" for Nearest Distributor.

Black & Decker Tapgun

Drives up to 1/4" taps for threading holes in steel, cast iron, brass or aluminum. Automatic reversing mechanism. Lightweight. Easy to handle. *The only tool of its type!*

For more facts circle 578 on Reply Card

B&D **Black & Decker®**

Portable electric tools . . . *power-built* to last!

You can expect

MORE COMFORT PER FUEL DOLLAR

from *Modine* UNIT HEATERS

Comfort-economy zone

Outlet air temperatures, velocities and volumes are *correctly related* in Modines for maximum comfort at reduced fuel costs. *Exclusive* Modine velocity generator produces penetrating heat throw, cuts through cold air strata near floor . . . improves overall heating efficiency.

Horizontal delivery type, direct pipe-suspended, can be installed as recessed or fully concealed unit.

Modine horizontal unit heaters

Built for steam and hot water service, units are available in blow-through and draw-through types . . . in 36 different capacities.

For drying and processing applications, hot water units with higher fin-to-tube ratios may be operated on steam.

Special Modine HCR high-corrosion-resistance premium models are available where resistance to internal corrosion is a problem.

Vertical delivery type. Light weight unit installs easier without special ceiling supports.

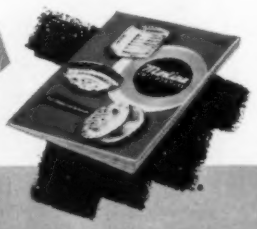
Modine vertical unit heaters

Offered in 26 different models each with choice of 4 types of air deflectors. Compact design permits ceiling mounting above craneways. Optimum fin spacing minimizes condenser clogging, especially where excessive foreign material is present in atmosphere.

SU-1322

Write for free Bulletin 155

Gives you complete unit heater details. Write Modine Mfg. Co., 1563 DeKoven Ave., Racine Wis.



Modine UNIT HEATERS

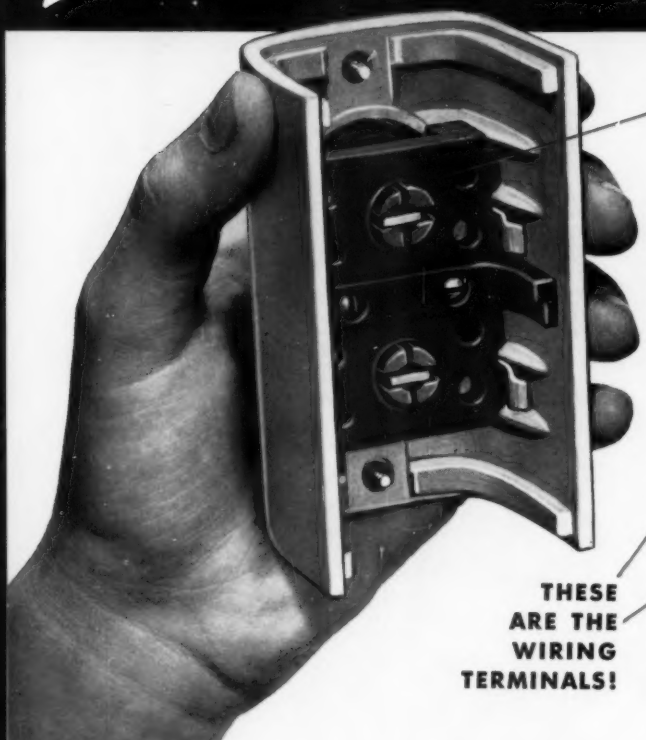
In Canada: Sarco, Ltd., Toronto

For more facts circle 579 on Reply Card

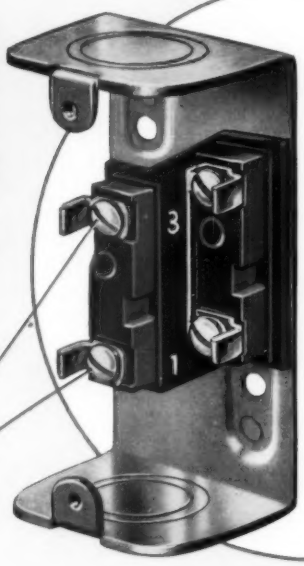
For more facts circle 580 on Reply Card →

Brand New Idea

in STANDARD-DUTY STATIONS



THE CONTACT MECHANISM IS IN THE COVER!



THESE ARE THE WIRING TERMINALS!

EASIER TO WIRE!

No skinned knuckles

No cramped wiring space

Here's an entirely new idea in push button stations—a wrap-around cover—with the contact mechanism part of the cover. Removing the cover exposes the terminals for instant and easy wiring. Strong, spring type, silver plated contacts connect the push button assembly in the cover with the terminals in the base.

Matching ribs in the cover and notches in the terminal blocks assure that the wiring connections are always correctly made. A bakelite shield protects the contact mechanism and prevents careless wiring from interfering with the contact operation. Concentric knockouts are provided in both top and bottom of the heavy metal base.

You will want to know about this new standard-duty station because—it is good looking—it takes less time to install—it was designed for the convenience of the installation engineer.

Let us show you a sample of this "brand new idea" in standard-duty stations!

A-B Quality

ALLEN-BRADLEY

QUALITY

MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ontario

Bulletin 800 standard-duty push button stations can be supplied with one, two, or three buttons, or as a selector switch. Also available with pilot light. Furnished only in NEMA Type 1 enclosures.

9-56-MR

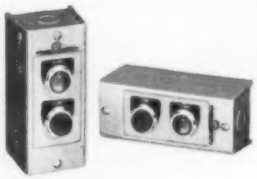
Also... **NEW HEAVY-DUTY PUSH BUTTONS**

BULLETIN 800

NEW FLEXIBILITY!

You can assemble any special heavy-duty station from a small stock of standard push button, selector switch, and pilot light components. There is no need to wait for long delivery of your special stations.

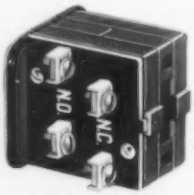
Stations can be arranged for either vertical or horizontal mounting. Name plates can be rotated to any position, replaced with any standard marking, or removed entirely.



NEW ENCLOSURES!

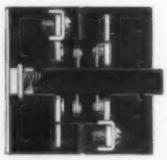
Each button, selector switch, or pilot light is a self-contained unit which can be mounted in attractive new enclosures. Standard enclosures accommodate up to eight units, but enclosures can be furnished for larger numbers.

NEW CONTACT BLOCK!



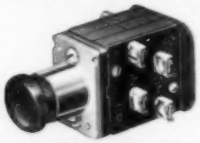
Above: View of contact block, showing terminals for normally open and normally closed contacts. Right: Contact block, with cover removed, showing stationary silver alloy contacts and pushrod carrying the moving contacts.

Bulletin 800 heavy-duty push buttons have the same molded contact blocks that have proved so dependable in Bulletin 800T oiltight push buttons, although they are not themselves oiltight. And all of them are equipped with double break, silver alloy contacts.

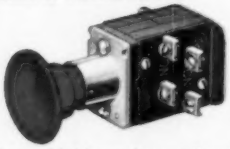


NEW OPERATORS!

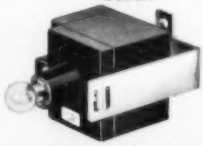
Operators, which mount on the contact block, are available in many types, and push buttons come in various colors.



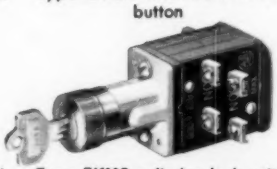
Type AK2B flush head START button



Type DK6A mushroom head button



Type PK16 pilot light with transformer



Type EK11B cylinder lock unit

9-56-MR

A-B Quality

ALLEN-BRADLEY

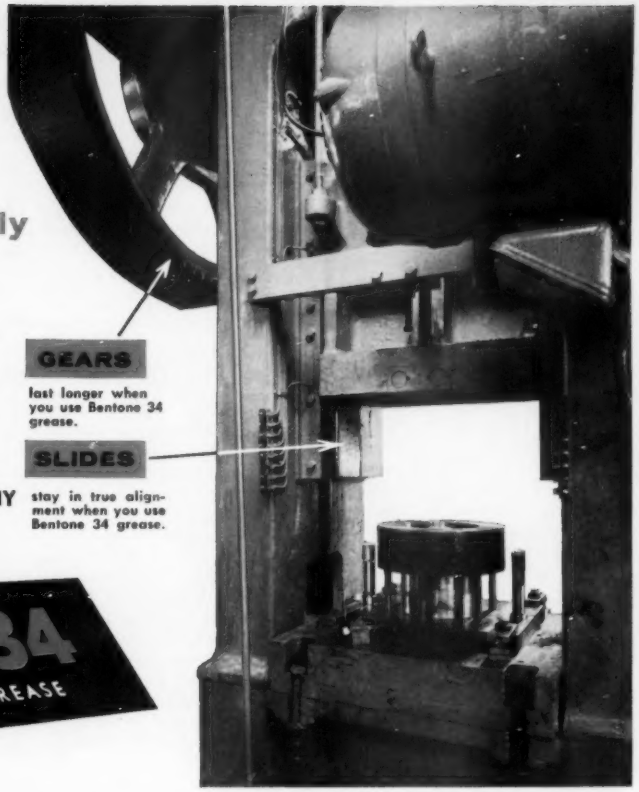
QUALITY MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. In Canada—Allen-Bradley Canada Ltd., Galt, Ontario

Bentone* 34 Based Grease

Takes Shock Load Easily on 160 TON Press

Heavy duty presses run fair and true under high pressures and shock loads when moving parts are lubricated with greases compounded with Bentone* 34. The F. Hohlfelder Co., Cleveland, Ohio, found by test the most economical, best-lasting grease is one compounded using Bentone 34.



Dutch Boy * TRADEMARKS REGISTERED

NATIONAL LEAD COMPANY
BAROID DIVISION
P. O. Box 1675
Houston 1, Texas

BENTONE* 34
FOR MULTI-PURPOSE GREASE

5635

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ALEMITE DIV., STEWART-WARNER CORP., Chicago, Ill.
ALLUBE CORP., Glendale, Calif.
THE AMERICAN LUBRICANTS CO., Dayton, Ohio
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BATTENFELD GREASE & OIL CORP., Kansas City, Mo.
BATTENFELD GREASE & OIL CORP. OF CALIFORNIA, Compton, Calif.
BATTENFELD GREASE & OIL CORP. OF NEW YORK, North Tonawanda, N. Y.
BEL-RAY CO., INC., Madison, N. J.
BOBBISH INDUSTRIAL PRODUCTS, CO., Dearborn, Mich.
THE BROOKS OIL CO., Pittsburgh, Pa.
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CONSUMERS COOPERATIVE ASSOCIATION, Kansas City, Mo.
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ILLICO INDEPENDENT OIL CO., Lincoln, Ill.
INTER-STATE OIL CO., Kansas City, Kansas
KEYSTONE LUBRICATING CO., Philadelphia, Pa.
LUBRICATION CO. OF AMERICA, Los Angeles, Calif.
MacMILLAN OIL CO. OF ALLENTOWN, Allentown, Pa.
MAGIE BROTHERS, INC., Chicago, Ill.
MAGNUS CHEMICAL CO., Garwood, N. J.
MANITOBO CO-OPERATIVE WHOLESALE LTD., Winnipeg, Man., Canada
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MID-STATES LUBRICANTS, Kansas City, Mo.
MIDWEST OIL CO., Minneapolis, Minn.
THE OHIO GREASE COMPANY, Loudonville, O.
OIL-KRAFT, INC., Cincinnati, Ohio.
OIL DISTRIBUTORS OF PHILADELPHIA, Philadelphia, Pa.
ONYX INTERNATIONAL, Jersey City, N. J.
PANTHER OIL & GREASE MFG. CO., Fort Worth, Texas
PANTHER OIL & GREASE MFG. CO. OF CANADA, Toronto, Ontario, Canada
PENN-CREST OIL & GREASE CORP., Long Island City, N. Y.
PENN PRODUCTS CO., DuBois, Pa.
PHOENIX OIL COMPANY, Augusta, Ga.
A. B. PLATING SUPPLY CO., Milwaukee, Wisc.
PRAIRIE STATES OIL & GREASE CO., Danville, Ill.
PRECISION BEARING & TRANSMISSION CO., Omaha, Nebr.
RILEY BROS. INC., Burlington, Iowa
THE SAHARA OIL CO., DuQoin, Ill.
SASKATCHEWAN FEDERATED COOP. LTD. Regina, Sask., Canada
ADOLPH SCHMIDS ERBEN S. A., Berne, Switzerland
SERVICE LUBRICANTS, INC., Chicago, Ill.
L. SONNEBORN SONS, INC., New York, N. Y.
SOUTHWEST GREASE & OIL CO., INC., Wichita, Kan.
SOUTHWESTERN PETROLEUM CO., Fort Worth, Texas
SPECIALTY PRODUCTS CO., Jersey City, N. J.
SUNLAND REFINING CORP., Fresno, Calif.
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THREE RIVERS REFINERY, Three Rivers, Tex.
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TOWER OIL CO., Chicago, Ill.
TRANSMISSION EQUIPMENT CO., Pittsburgh, Pa.
TRI-STATE PETROLEUM CO., Philadelphia, Pa.
UNITED COOPERATIVES, INC., Alliance, Ohio
UNIVERSAL AVIATION SUPPLY, Wichita, Kan.
C. C. WAKEFIELD & CO., LTD., Toronto, Ontario, Canada
THE WARREN REFINING AND CHEMICAL CO., Cleveland, Ohio
THE WAVERLY OIL WORKS CO., Pittsburgh, Pa.
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*T.M. Reg.

BENTONE·34®

For more facts circle 581 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

1—FLUORESCENT FIXTURE for outdoor lighting use

Described as rugged and weatherproof, this aluminum fluorescent fixture is suggested for lighting tunnels, underpasses, loading docks or shed areas. Weighing 50 lb and measuring 72⅛ in. long, the new fixture (Type HLG) consists of two assemblies: a housing for the lamps, ballast, wiring and reflectors; and a door which supports a gasketed plastic cover. The door opens by turning three catches; when open, it can hang on its hinges or be removed by unhooking them.

Made in two sections, the reflectors can be removed by hand pressure. Removal of one reflector section provides access to terminal block and ballast. By means of L-shaped brackets, the fixture can be mounted continuously in rows on ceilings or walls, then rotated horizontally to desired position. A degree scale on the end hub of each bracket is provided for accurate alignment. The fixture uses 95-w, rapid start outdoor type fluorescents, cool or warm white. Crouse-Hinds Co.

2—PVC EXPANSION JOINT for rigidity fixed piping

This slip type expansion joint is made of unplasticized polyvinyl chloride in 1-, 2-, and 3-in. sizes; it may be used with piping of smaller diameters by employing reducing bushings. All sizes allow an expansion of 3¾ in. The new unit is designed for use with rigidly fixed PVC piping subjected to thermal cycles. It has a Neoprene O-ring packing and is declared suitable for a wide range of corrosive services. When made of normal impact PVC, the 1-in. size has a pressure rating of 205 psi at 75 F, and of 120 psi at 140 F. Tube Turns Plastics, Inc.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 229-230.

4—WATER GAGE provides two color-readings

Bright two-color red and green readings and greatly reduced maintenance are among features announced for the Yarway Color-Port Water Gage. It is designed for high pressure boilers up to 3300 psi. In the port-type openings, water shows green, steam shows red. Thus a full gage is all green and empty gage is all red. Individual cover glass assemblies permit servicing of the gage in place, without removal from boiler. Large diameter port openings give increased visibility and a variety of mirror arrangements serve to bring the brilliantly lighted, head-on view of the gage face to operating floor. Yarnall-Waring Co.

5—CEILING CLIP to fasten suspended loads

This ceiling clip and guard combination is designed to provide powder-actuated stud driver users with a fast, inexpensive method of fastening suspended loads, grids or structures. The clip is inserted directly into the guard and the stud is driven through the clip into the base surface. Studs designed for steel or concrete applications are available, and the clip itself is an angle bracket made of 14-gage steel, zinc plated with a hole in one leg. Remington Arms Co., Inc.

6—PROTECTIVE SEALER for the masonry surfaces

Surfa-Sele is announced as a pigmented protective sealer that can be applied even over damp masonry surfaces for the prevention of moisture seepage and dampness. It is supplied in liquid form and formulated with a fish oil vehicle said to

have unusually low surface tension which results in unique penetrating and wetting ability. It is explained that this material has more wetting power than water itself, and actually displaces trapped moisture and surface water and adheres tightly to the surface. It dries to a tight, tough semi-gloss white finish. Finish coats for indoor use can be tinted with colors-in-oil. Surfa-Sele contains no lead, manufacturer states, and is particularly applicable where moisture and steam present a maintenance problem. Rust-Oleum Corp.

7—STACKING RACK holds "unstackable" materials

For handling and storage of package materials, products or parts which cannot be stacked without support, this portable stacking rack consists of open-side steel frame units which can be moved by fork

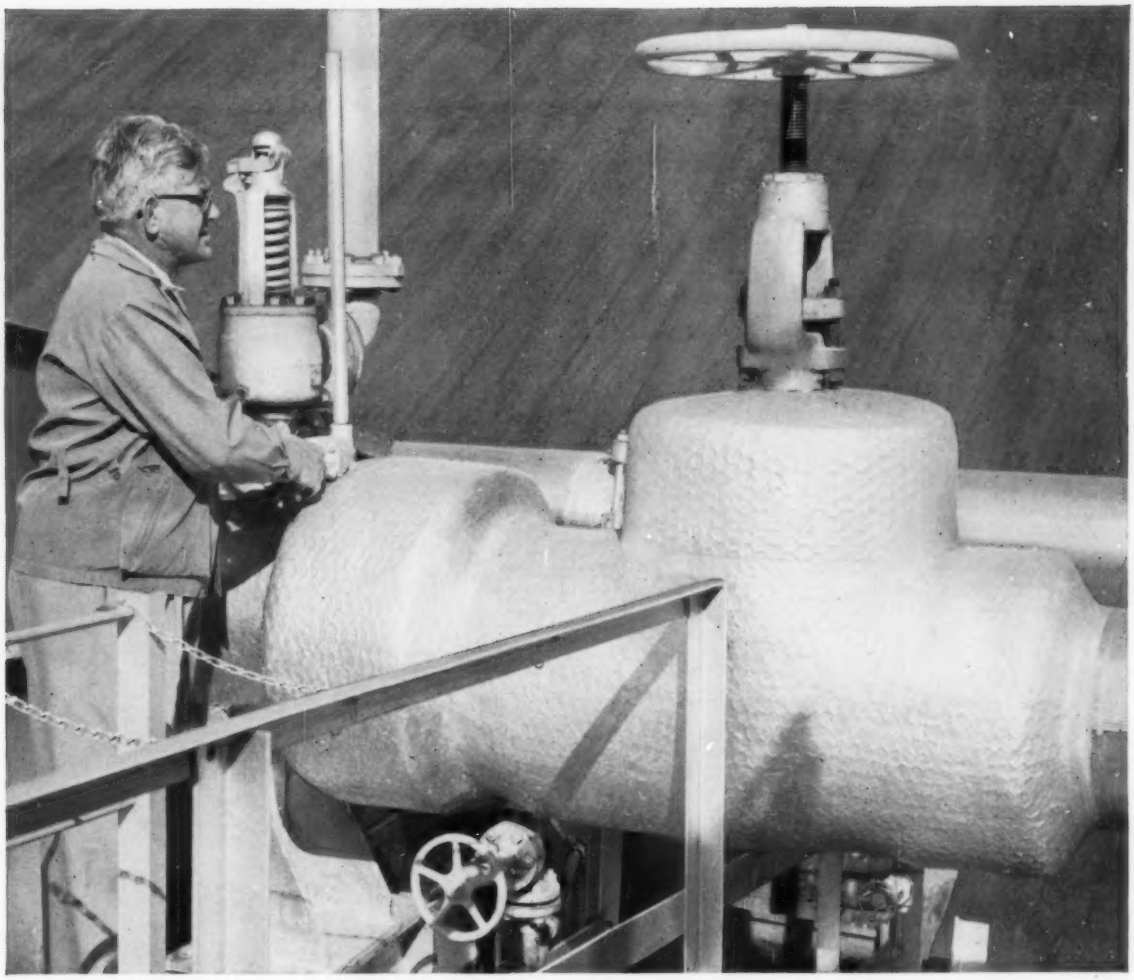
lift or platform truck, according to the needs of production and inventory. If required, they can be used as handling racks and moved right up to a work or processing area to receive finished parts. At the same time, they can be stacked to any practical height when loaded or unloaded, company says and can be used to form either permanent or temporary warehousing facilities in any available area. Open sides facilitate order picking, it is said, as well as tally and inventory

(Continued on page 158)

3—PORTABLE ACOUSTICAL UNIT cuts down on plant noise

Acoustosorber is a portable industrial "sound-catcher"—a pyramid-shaped acoustical unit designed for suspension from ceiling, which minimizes deafening noises that bounce around in enclosed premises where sound is "out-of-bounds." Unit is composed of an outer sheet of perforated aluminum backed with a mineral fiber blanket, 2 in. thick, and is shipped in flat sheet form to job site, where it is shaped along pre-embossed lines into a box-like pyramid. It is 28 in. long on a side, has an altitude of 24-in., and weighs about 1¾ lb. It is suspended from ceiling on wires attached to a stapling flange on the unit.

This sound-catcher is suggested for noisy premises where no built-in sound absorbers have been provided, and particularly where noise cannot be modified at source or isolated from other areas. Company engineers claim that this unit reduces disturbing noise in areas adjacent to the "cone of little noise relief;" clips peak noise impulses; absorbs reflected sound waves; lowers reverberation time in sound-conditioned areas, and makes noises directional and identifiable—instead of having persons working in the area sense that they are engulfed in a sea of noise. United States Gypsum Co.



This Crane valve has 20-year cost-free record on 400 psi. steam at 750° F.

Twenty years on this high-temperature steam boiler outlet service with never a wrench on it—that's valve performance in any man's language.

This Crane 8-inch No. 179U cast steel stop-check valve has racked up just such a record at Fort Bend Utilities Co., Sugar Land, Texas, and is working as smoothly today as it did two decades ago.

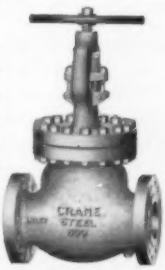
The Fort Bend Utilities plant—a subsidiary of the neighboring Imperial Sugar Co.—finds this Crane stop-check an important aid to boiler efficiency.

Its high-lift disc permits maximum flow-through, with minimum pressure drop under varying load conditions. Seating is instantaneous on back flow.

On manual closure, about once yearly for boiler servicing, the valve has never failed to respond smoothly and seat tightly.

To valve users experienced with Crane quality, this performance record is not so unusual. Thousands of Crane stop-checks throughout industry are giving similarly outstanding service.

The superior materials, the top-flight engineering and construction designed into all Crane valves give them service capacity and durability second to none.



Get these advantages next time you order valves: specify Crane and be *certain* of the valve service you want. Consult your local Crane Representative or write to address below.

CRANE VALVES & FITTINGS

PIPE • KITCHENS • PLUMBING • HEATING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 582 on Reply Card

G-E LAMPS GIVE YOU MORE FOR ALL YOUR LIGHTING DOLLARS

You can "measure" the light output of G-E fluorescent lamps, *right in the carton!*

GENERAL ELECTRIC UNIFORMITY IS WHY—G-E 40-watt fluorescent lamps give you all the light you pay for. Their light output is so uniform that you're assured of their performance—even before you put one in a socket. There's practically no such thing as a "lazy" G-E lamp—a lamp that uses full power without delivering its rated lumen output. Less than 1% of all General Electric 40-watt fluorescent lamps are as much as 5% below their average published light output of 2500 lumens.

G-E LAMPS SAVE YOU MONEY—Today's General Electric 40-watt fluorescent lamps deliver 30% *more* light than those you bought in 1950. Based on the average cost of burning 24 G-E 40-watt fluorescent lamps, this gives you a *bonus of light* worth almost $55! Put another way, this *extra* light equals the total light output of 79 100-watt incandescent bulbs over their entire life!

But G-E lamp uniformity means more than uniform *light* output. It also means freedom from defects—on the average, 99.9% of all G-E 40-watt fluorescent lamps are free from physical defects that could affect performance in service. And uniform life, too, means that after one year of service in single shift plants (2500 hours) an average of 99 out of 100 General Electric 40-watt fluorescent lamps will still be burning—98 out of 100 will still be in service after a year in double shift plants (4000 hours).

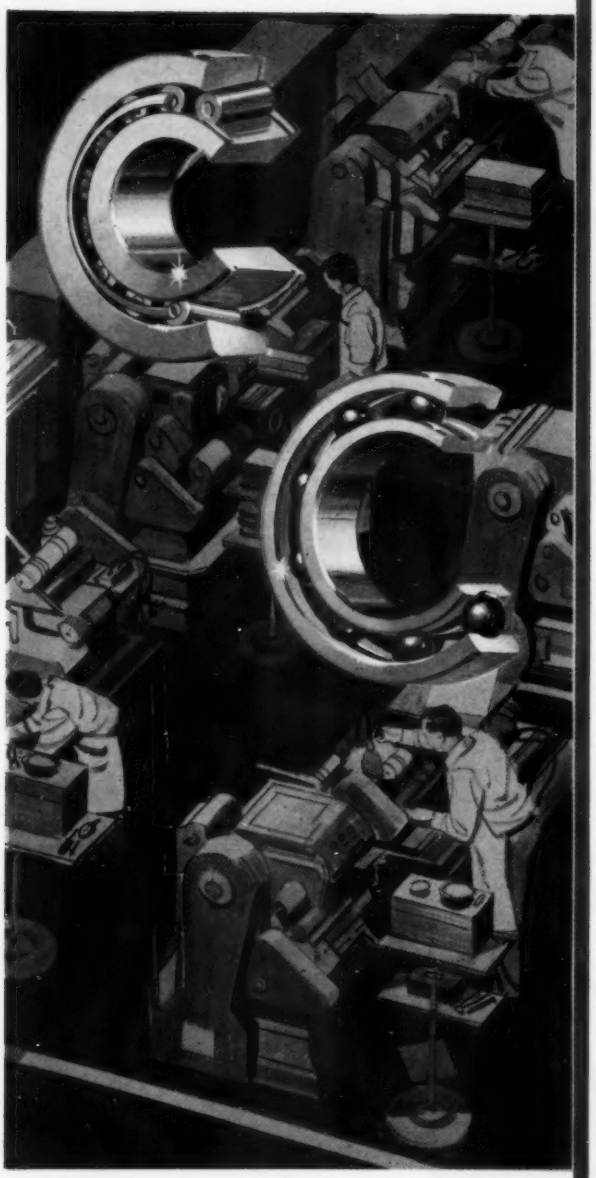
For more information on what uniformity in G-E fluorescent lamps means to you write: General Electric Co., Large Lamp Dept. PE-11, Nela Park, Cleveland 12, O.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 575 on Reply Card

Poco Hypronox keeps 'em rolling... *far longer!*



Protect production by specifying the PURE ball and roller bearing grease that never hardens or thins out

PURE'S *Poco Hypronox Greases* contain specific oxidation inhibitors that are missing in ordinary soda-base greases. And that means extra bearing protection at all times, for *Poco Hypronox* never hardens or breaks down.

Also, *Poco Hypronox* has the high film strength, mechanical stability, anti-friction and anti-wear features that keep all your ball and roller bearings running far longer and smoother.

You purchase hundreds of items to keep your plant operating . . . but none more important to high-speed production than your ball and roller bearing grease.

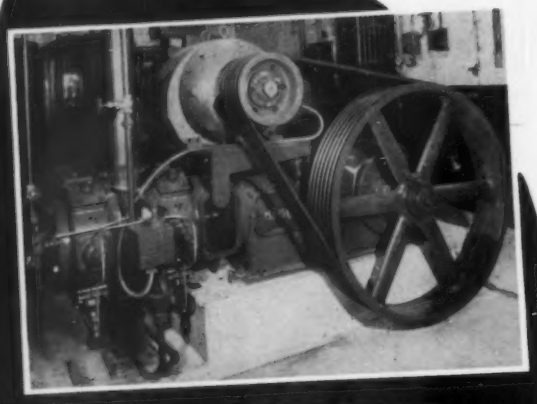
So get the full story on *Poco Hypronox Greases* by calling your local Pure Oil representative today. He'll also tell you about the great PURE line of multipurpose lubricants that are *sure* to help you Simplify and Save.

BE SURE PURE WITH PURE

THE PURE OIL CO.
35 E. Wacker Dr., Chicago 1, Ill.

For more facts circle 583 on Reply Card

PPC



You Get *RELIABLE*
COMPRESSOR
PERFORMANCE

with
Pennsylvania
AIR CUSHION VALVES

Pennsylvania compressors are designed to earn and keep your confidence by providing quiet, efficient service even under the most exacting conditions — and with low maintenance cost. Actual valve efficiency improves with use.

The AIR CUSHION valve is tight seating and constructed entirely without bolts — without nuts or screws that might work loose or burn fast; one reason why Pennsylvania compressors give many years of dependable performance.

All Pennsylvania compressors have an extra rugged, dust and oil tight main frame that is completely weatherproof. Solid ends connecting rod, wedge adjusted crank pin and crosshead pin bearing, marine type crosshead with shim adjusted shoes and force feed cylinder lubrication, assure performance-proved compressors adaptable to most applications.

Write for Bulletin A-201.

PENNSYLVANIA PUMP & COMPRESSOR COMPANY

Main Office & Works, Easton, Pennsylvania

HAE-PP325-856 **EARNING CONFIDENCE SINCE 1920.**

PENNSYLVANIA
PUMP AND COMPRESSOR COMPANY

For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 154)

work. Varying in size, units are made to specification according to size and shape of material handled. Republic Steel Corp.

8—PILOT POSITIONER offers control accuracy

This fast acting pilot positioner is designed for applications requiring precise repositioning even for very small changes in air pressure from the controlling instrument. Maximum power is available at all times for repositioning the controlled device, it is noted. Supply air at 15 to 20 psi is connected to the positioner, with a direct-acting relay transmitting changes in pilot pressure from the controlling instrument. Air consumption is reported exceptionally small. It is estimated that a valve equipped with this precision pilot positioner can be repositioned six times faster than with many pilots. Bulletin V-530 gives details. Johnson Service Co.

9—IMPROVED GUN shoots tough materials

Built to deliver the toughest materials at a 30 per cent greater output is a new Flo-Gun. It is equipped with a tungsten carbide valve for abrasive materials such as

putty, caulking, sealers, etc. (Another model has a hardened steel valve for ordinary light or heavy materials.) Rugged and larger in overall construction, the unit weighs only 4½ lb and is designed to reduce operator fatigue. Features include a new and larger porting system coupled with an unobstructed flow of material from inlet to outlet to permit greater flow. A built-in ball-bearing swivel at the inlet simplifies operation of the gun. Alemite Div., Stewart-Warner Corp.

10—EPOXY RESINS cure at room temperature

Epoxy resins available with safety hardeners which are non-dermatitic and resistant to high humidities are announced. As explained by manufacturer, epoxy pastes have been limited in application because of technical difficulties in achieving a safe status, and these epoxy resins and safety hardeners are expected to extend their scope in semi-skilled hands. As non-shrinkage, chemically inert, high bond

the NEW topping for cement floors indoors or outdoors

Super Bondsit® won't chip, dust, or rust

Here's a versatile new topping for cement floors—anywhere. It's just as effective and durable outdoors or indoors. It won't chip. It won't dust. It won't rust. It's chemical, spark, and skid resistant. Super Bondsit is an emulsion containing liquid Latex that makes an unbeatable concrete floor topping or patch when incorporated into cementitious mixtures.

Now with only one material—versatile Horn Super Bondsit—you can solve the varying concrete floor patching and topping problems in all these industries: • paper • rubber • textile • electrical • dairy • sugar • drug • chemical • and in many more industrial and commercial buildings, as well as for playgrounds and tennis courts. For full information write to: Dept. H27-115.

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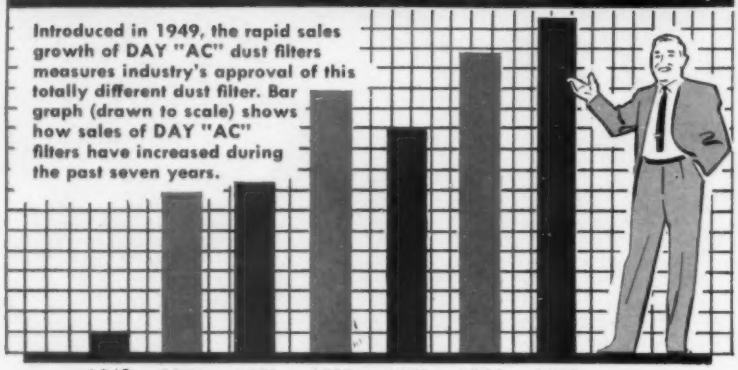
For more facts circle 585 on Reply Card

DAY REVERSE JET DUST FILTERS

HAVE EARNED INDUSTRY'S ACCEPTANCE

Introduced in 1949, the rapid sales growth of DAY "AC" dust filters measures industry's approval of this totally different dust filter. Bar graph (drawn to scale) shows how sales of DAY "AC" filters have increased during the past seven years.



HERE'S WHY

DAY Reverse Jet Dust Filters HAVE EARNED ACCEPTANCE!

Utilizing the Hersey principle of reverse air cleaning, DAY "AC" dust filters offered industry a needed, long overdue, improved dust filter. This filter has many benefits never before found in any dust filter equipment.

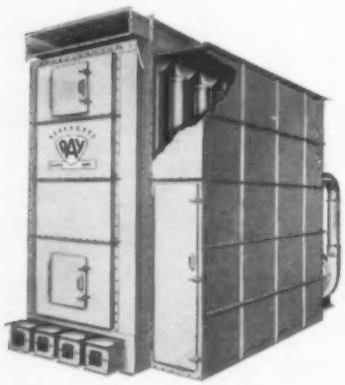
● NEW HIGH EFFICIENCY PERFORMANCE—This filter provides efficiencies measured as high as 99.99+%. This assures cleaner air and higher product recovery.

● NEW FILTER MEDIA—DAY *felted* filter media traps more dust than woven fabric. Felt gives higher efficiency, longer life and has same pressure drop as woven fabric.

● NEW DESIGN FEATURES—The Hersey principle of reverse jet cleaning, DAY self-adjusting blow rings, sanitary square-to-round air inlets, automatic-continuous operation, superior filter media, are just a few of the features introduced by DAY.

● NEW FILTER TUBE CLEANING—Patented self-adjusting blow rings clean the entire filter tube automatically and continuously, to give DAY filters an air handling capacity 5 times higher than ordinary filters.

● NEW LOW INSTALLATION COSTS—Unit sub-assembly saves time and money—up to 75% on filter erection costs.



Licensed by H. J. Hersey, Jr.

The DAY "AC" Reverse Jet Dust Filter is the largest selling filter of its type in the world!

Place the successful operation of your dust control system in our hands. Experienced DAY Application Engineers will survey your plant and supply you with engineered recommendations. With DAY there is no divided responsibility. Our guarantee of satisfaction is backed by 75 years of experience.

Bulletin 559 gives important facts and complete description of the DAY "AC" dust filter. Write toDAY for your copy of this informative 24-page bulletin.

75 YEARS DAY SERVING INDUSTRY SINCE 1881

The DAY Company

807 Third Avenue N. E., Minneapolis 13, Minnesota
IN CANADA: P. O. Box 700, Fort William, Ontario
Branch Plants: Buffalo, Fort Worth and Toronto, Ontario
Representatives in Principal Cities

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 154)

strength insulating materials, epoxy pastes have many industrial applications. Serving these are steel-filled Epocast 154, aluminum filled Epocast 152, and mineral-filled Epocast 150. Company says these epoxy pastes cure completely at room temperature upon the addition of the safety hardener. Furane Plastics, Inc.

11—TOOL BALANCERS reduce waste motion, fatigue

Designed to reduce waste motion and prevent operator fatigue, this line of tool balancers is said to accommodate any suspended load up to 50 lb. The line includes seven models—three designed to suspend

smaller, lighter tools such as screw drivers, nut setters, drills and tappers; the remaining four, with capacities of 20, 30, 40, and 50 lb, for heavy-duty use with impact wrenches, multiple nut setters and other heavy tools. The heavy-duty balancers feature a built-in safety lock that automatically locks cable drum under unusual conditions, and prevents tool from dropping. All balancers are designed with straight-line pull, which eliminates excessive wear on cable, company says. Adjustable cable stops, which can be reached from floor level, suspend tool at any convenient operation height. Keller Tool Div., Gardner-Denver Co.

12—VACUUM EQUIPMENT aids in acid handling

Of importance to plants using acid in carboys and drums is equipment which can be furnished as part of the regenerant system of water treatment processes, such as demineralizatiotn, hydrogen zeolite ion exchange and acid stabilization. It offers a safe and simple method of handling any amount of acid that must be diluted with water, says company—this vacuum acid system lets you transfer, measure and dilute acid without lifting carboys or drums and without subjecting vessels to positive pressures.

Only a water line need be added to the system as furnished. Acid is drawn from the drum or carboy to the measuring tank by the vacuum created by the water operated ejector. When the proper amount of acid is in the tank, the flow is

Recommended reading for MAINTENANCE ENGINEERS

In the pages of this Painting Manual are data every maintenance engineer will want to have when faced with problems involving protective coatings.

How to save time and money in surface preparation; how to secure good adhesion with vinyl-based top coatings; how many top coats to provide effective protection against a given corrosive; common spraying problems and how to remedy them.

Primarily, of course, the Manual deals with the Tygon series of protective coatings—the protective coatings developed specifically to meet severe corrosion problems.

Detailed data on the characteristics of the various Tygon coatings; where and how to use them; complete tables of chemicals to which the coatings are resistant; these and other helpful data are yours in this free manual.

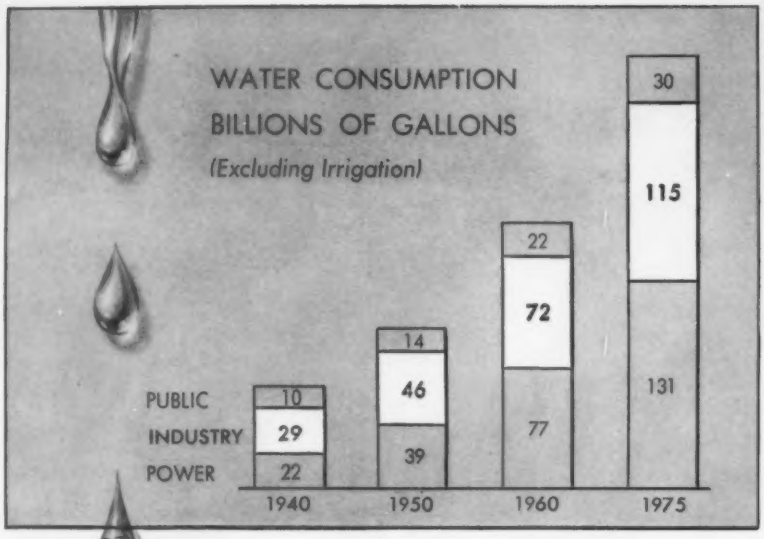
Write for it today.
Ask for the Tygon Painting Manual.

343E

Plastics & Synthetics Division

U. S. STONEWARE
AKRON 9, OHIO

For more facts circle 587 on Reply Card



What to do when

WATER SHORTAGES

threaten Your business

Within 20 years, the public and industry will need twice as much water. In some areas, wells are running low . . . stream pollution is serious. New resources will cost billions . . . *if they can be found at all.* It's not too early to take strong measures in your business.

Install water meters to check and report on consumption in your plant. The meters will uncover hidden leaks and careless habits. They will show where you can save by installing automatic shut-off devices, by improving heat exchangers, by changing processes, by recirculating or reconditioning water for re-use.

Though Neptune now makes more than meters, water conservation is our biggest business, growing rapidly with the nation's needs for water. Over ten million Trident water meters now in use. We'll be glad to consult with you.

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For more facts circle 588 on Reply Card

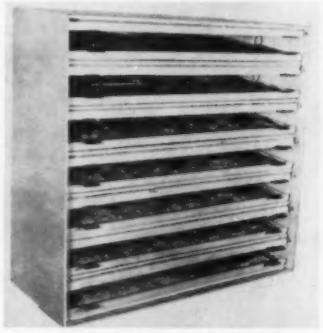
NEW PRODUCTS

(Begins on page 154)

stopped by opening a vacuum breaker; excess acid draws back to the supply source. After the dilution tank is filled with water, the measured acid is drained into the dilution tank. The proper amount and concentration of acid is then ready for use in the regeneration system. Graver Water Conditioning Co.

13—AIR FILTER is dry type high-efficiency unit

Designed for the high-efficiency field, the Multi-Pak Air Filter is claimed especially suitable for chemical and pharmaceutical plants, and film, optical and electronics manufacturing plants. It is a dry type air



filter developed for applications that require air filters of standard construction but need higher-than-normal cleaning efficiencies. Its effectiveness can be regulated by a variety of media, ranging from inexpensive cellulose fiber sheets, through dense, highly effective glass fiber mats. The variety of thicknesses, densities, and textures make it possible to obtain any desired efficiency in dust and smoke removal from plant pollen to tobacco smoke, it is noted, even at extremely high temperatures. There are more than 50 sq ft of media in the seven pockets of one 2 by 2 ft by 22¾ in. unit—13 times more media than face area. Advantages claimed are low initial cost, low maintenance, easy handling. Bulletin 237 gives more information. American Air Filter Co., Inc.

14—ELEVATING CONVEYOR for chemical, food plants

Of original design for the chemical, food and pharmaceutical industries, the Model 30 Buck-El is a standard sanitary bulk material elevating conveyor manufactured with sanitary components and easily disassembled for cleaning. Materials of construction include stainless steel casing and buckets, stainless steel shafts with vinyl covered pulleys and food grade Neoprene belting and gasketing.

The release of simple spring clamps permits removal of lightweight casing covers from top to bottom. Belt and buckets may then be slipped off the pulleys as a unit for hand cleaning or sterilization. Overhung pulley design is such

You don't pay for sludge like this when you buy Morton Purex Salt

When you buy Morton Purex Salt, you get high purity evaporated salt that is made in a controlled-particle size to prevent packing and channeling. None of your freight bill or purchase price goes toward paying for shale and sulphates . . . insolubles like those shown on the filter pad above. (And the cost can be considerable. In every 100 lbs. of any type of rock salt, you are paying for up to 5 lbs. of insolubles.)

With Purex, no time or labor is spent in cleaning out insoluble matter from your brine making system to keep it functioning at peak capacity. For Purex is 100% soluble. Morton Purex will leave no accumulation of material in either brine or water softener tanks. It can be used in bulk wet-storage systems, and in the Morton Model-E Brinemaker.

For more information about Morton Purex Salt, or for free, expert help on any water-softening or brine-making problem, write or wire:

MORTON SALT COMPANY
INDUSTRIAL DIVISION
Dept. PLE-11, 120 So. La Salle Street, Chicago 3, Illinois

For more facts circle 589 on Reply Card

Use SAFETY GRIP-STRUT grating

Wherever a safe footing is required

Grip-Strut circular stairway on Shell Oil tank in Portland, Ore.

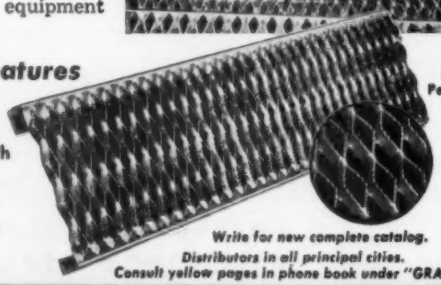
See how Shell Oil uses Grip-Strut for a safe ramp between tanks.

View looking down circular stairway on Shell Oil tank shown above.

SAFETY GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded in steel or aluminum, in standard sizes and gauges. Safety GRIP-STRUT presents an open space, in a diamond pattern, in excess of 55% of the area for ready access of light and air and gives a positive NON-SKID footing in all directions. Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

Important Safety Features

- ★ Fire proof
- ★ Slip proof
- ★ Maximum strength
- ★ Minimum weight
- ★ Easy to stand on
- ★ Cool in summer—warm in winter



Pat. Pending

Write for new complete catalog.
Distributors in all principal cities.
Consult yellow pages in phone book under "GRATING"

GRIP-STRUT division
THE GLOBE COMPANY • *Manufacturers since 1914*
4016 S. PRINCETON AVE. • CHICAGO 9, ILL.

For more facts circle 590 on Reply Card

NEW PRODUCTS

(Begins on page 154)

that integral shaft and pulley assemblies may be withdrawn by loosening set screws. This leaves an empty casing with rounded corners for scrub-down or sterilization. The Bucket Elevator Co.

15—CALIBRATOR simplifies bolt tightening jobs

Meeting bolting specifications is reported greatly simplified when impact wrenches are calibrated with this direct-reading bolt tension calibrator. With this portable unit, wrenches are adjusted and set right on the job site. The self-contained calibrator is clamped to a convenient beam or column. Bolt, nut and washers of correct size are assembled into the calibrator and tightened with the impact wrench being adjusted. Bolt tension-in-pounds is then read on the calibrator gage. Regulation of air pressure and/or tightening time can be made until the specified number of pounds of tension are attained. The calibrator is usable with all ¾- ⅞- and 1-in. bolts that are at least 2½-in. long. It weighs 50 lb and comes in wooden case. Skidmore-Wilhelm Mfg. Co.

16—WELDING CURTAINS are made of nylon plastic

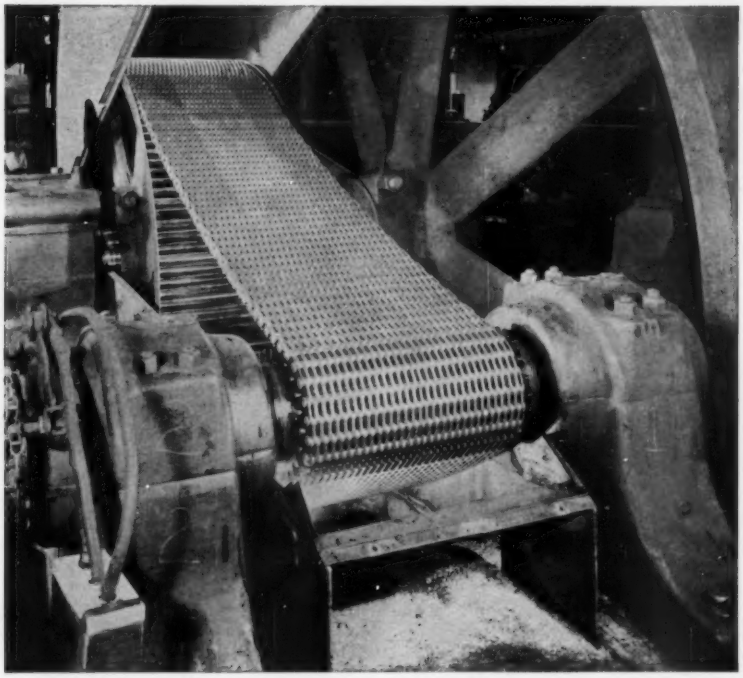
These curtains are made of vinyl and tough nylon combination described as almost indestructible. They offer increased safety, says manufacturer, because they do not absorb shop oils and greases and are flame-proof. Easy handling and compact storage are other features. According to company, the nylon-plastic material is only ⅓ the weight of most cotton duck, yet is 10 times stronger. This material is also reported to be inexpensive. It comes in red, green and yellow. Herculite Protective Fabrics, Inc.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

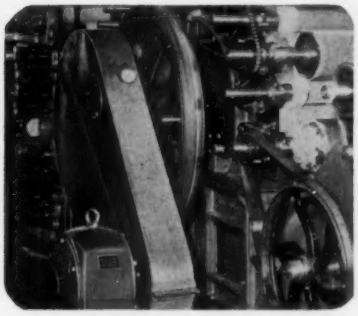
17—LEVEL CONTROL is displacement type unit

The Flexotrol Liquid Level Controller is announced as having eliminated both bearings and knife edges, and as providing a trouble-free controller for all services. The new design introduces a torque table which replaces pivoting members. The face of the torque table, engaging and driving the torque tube is free to twist under the action of the displacer. It is reported that performance of the controller is essentially constant and normal process residues do not hamper operation. Units are available with internal displacer chambers, or in models for direct displacer immersion in the process

Here's the record of LINK-BELT silent chain

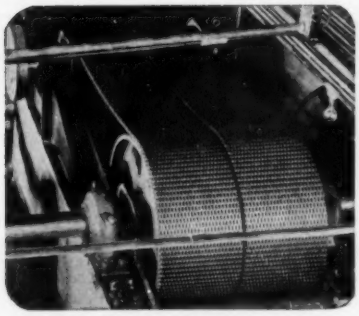


How do your drives compare?

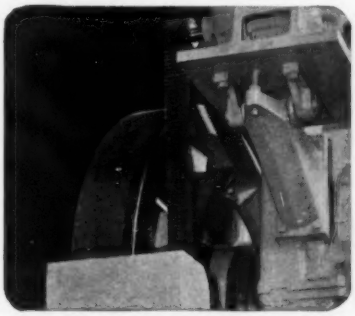


. . . IN SEVERE SERVICE. Link-Belt silent chain driving from a 450-hp motor easily handles the high load requirements of this merchant mill. These drives are often lower in first cost, always lower in ultimate cost — due to minimum maintenance requirements, long life and positive action which eliminates power losses due to slippage.

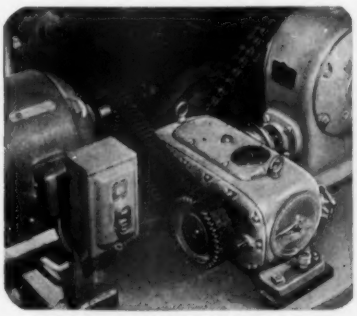
. . . UNDER ADVERSE OPERATING CONDITIONS. Humidity, heat, cold do not lower this chain's better than 98% efficiency.



. . . AT LARGE OR SMALL HP. A versatile line, these drives are available from fractional to thousands of hp.



. . . WITH LARGE RATIOS. Operates efficiently on extremely short centers at ratios as high as 10-to-1.



. . . IN LIMITED SPACE. Easy to assemble in close quarters, silent chain permits built-in drives, compact housings.

. . . AT HIGH SPEEDS. After 13 years on this newspaper press at speeds up to 4700 fpm, silent chain is still efficient.

For more details and advantages . . . for complete selection and technical data — ask your Link-Belt office or authorized stock-carrying distributor for a copy of 88-page Book 2425.

LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.038

For more facts circle 591 on Reply Card

SAVE HEAT-PREVENT DRAFTS

WITH R-W ELECTRICAL INDUSTRIAL DOOR OPERATORS

Production slow-downs, uncomfortable working conditions, and costly absenteeism can all be traced to blasts of wintry air that penetrate your buildings when doors are left open. Eliminate that "left-open" door problem, which may be costing you thousands of dollars each year, by installing automatic door operators. R-W "AUT-O-DOR" Electric Operators offer an exclusive opening and closing action that assures fast, easy operation and weather-tight closing, minimizes cold drafts, provides a savings in heating costs and helps to maintain even temperatures . . . all important factors which add up to greater employee comfort for added efficiency and production.

R-W offers a complete line of top-quality, heavy-duty industrial operators that will efficiently and economically open and close any door that swings, slides or folds. For quick, low-cost installation, maximum performance with a minimum of maintenance and over-all economy you can't buy a finer automatic door opener than an R-W "AUT-O-DOR" Electric Operator.

Please contact our nearest representative or home office for complete information . . . request your copy of Catalog No. 200.

Richards-Wilcox MANUFACTURING COMPANY
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Sliding Door Hangers & Track • Fire Doors & Fixtures • Garage Doors & Equipment • Industrial Conveyors & Cranes
School Wardrobes & Partitions.

For more facts circle 592 on Reply Card

NEW PRODUCTS

(Begins on page 154)

vessel. As an optional feature, direct mechanical liquid level indication can be provided as a final and complete check on the pneumatic system. Complete information is provided in Bulletin 456-1. Kieley & Mueller, Inc.

18—LOW COST CAMERA for industrial photography

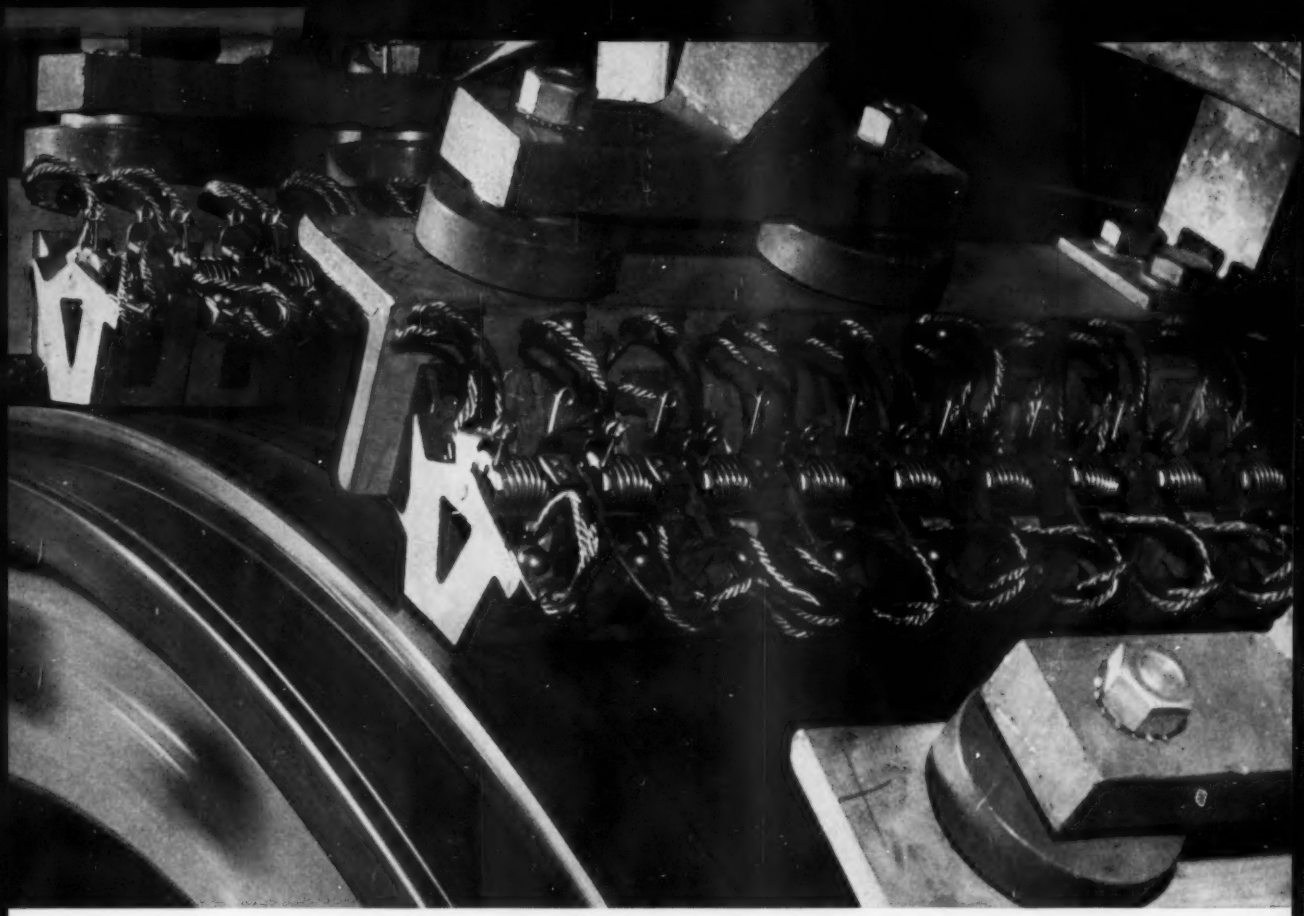
The Kodak Signet 40 Camera is a moderately priced miniature of new design for the experienced or beginning industrial photographer. Training slides, assembly techniques, safety pictures and others may be made in color and black-and-white with this 35 mm camera. It is claimed unique in that camera and

flashholder are styled as an integrated unit. Another feature of the camera is the provision of two interchangeable flash reflectors to deliver peak efficiency from midget flashbulbs frequently used with ultrafast films. The 3-in. reflector gives best light distribution with M-2 bulbs, the 4-in. one, with No. 5 or 25 bulbs. Camera, flashholder and two reflectors are included in the $65 price.

An exposure guide for use under daylight conditions is part of the camera, while a simple exposure guide for use with various combinations of flash lamps and films is part of the flashholder. The camera has a built-in rangefinder combined with the viewfinder in a single window. It is equipped with an Ektanon 46 mm f/3.5 lens. Finished in bright metal and black Kodadur, the Signet 40 weighs only 1 lb. A leather field case is available for it. Eastman Kodak Co.

19—POWER EXHAUSTER has extra low silhouette

The Axial Mushroom Power Exhauster is reported to have an overall height less than 18 in. and to be light-proof and weather-tight. It can be used for either air intake or exhaust. Aerodynamically designed guide vanes in the head combined with airfoil-shaped fan blades offer greater air moving efficiency with less noise and turbulence, according to company. Aluminum, stainless steel, or heavy-gage construction is available, and acid resistant paint is applied to the fans as needed for special installations. The fans are designed to exhaust 350 to 34,430 cfm of fumes, smoke and dust. Fan blade diameters range from 9 to 48 in. Fan and



How engineering development helps General Electric produce the right carbon brush for G-E motors and generators

One way General Electric engineers make sure G-E equipment gets the right carbon brush is to set up actual operating conditions in the laboratory and study brush performance. In one such test, various brushes are run in an air-tight chamber into which contaminants such as hydrogen sulphide, chlorine or nitrogen are pumped. Atmospheric pressure, temperature, humidity, brush pressure, current density and speed can all be controlled to test actual brush performance—and help select the right brush for the job.

THIS IS JUST ONE OF MANY STEPS which General Electric development engineers may take to help make sure your G-E equipment stays on the line. Keeping General Electric carbon brushes on your equipment will help you minimize maintenance and get top performance. And now you can get a carbon brush made by General Electric for any integral-hp G-E motor or generator. For more information contact your nearest General Electric Apparatus Sales Office or Distributor. Write for bulletin GEA-5597. General Electric Co., Section 774-2, Schenectady 5, New York.

Actual operating atmospheres can be simulated in this air-tight chamber to help get the right General Electric carbon brush on General Electric equipment.

Progress Is Our Most Important Product

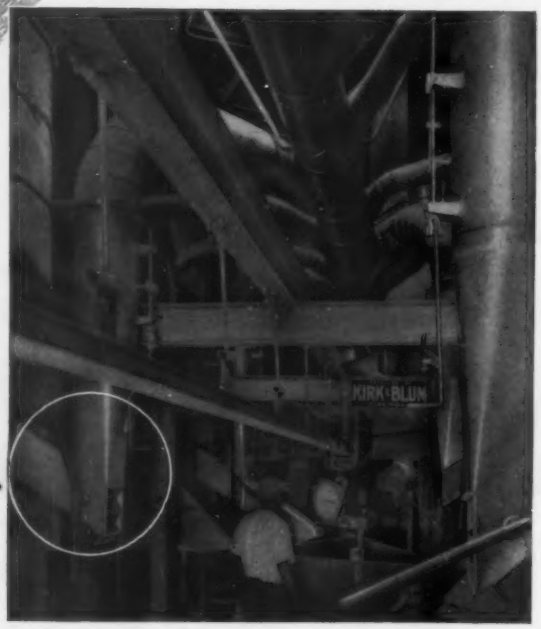
GENERAL ELECTRIC

For more facts circle 593 on Reply Card

KIRK & BLUM

DUST CONTROL SYSTEM

saves power through automatic orifice selection



Top portion of each chute serves as dust control inlet orifice. Dust is removed before it can reach batch area.

Each individual dust collection port is designed to be automatically opened by monorail batch car when it stops at particular silo. Closes automatically when car leaves.

COMPANY: The Chas. Taylor Sons, Co., Cincinnati, O., a Subsidiary of National Lead Co., manufacturers of special refractories.

PROBLEM: Dust collecting system for batch mixing area containing 7 silos of refractory grain which feed by chute into monorail batch car as it passes down line.

SOLUTION: Kirk & Blum system assures just the right balance to remove light dust without stealing usable product.

Ingenious damper arrangement conserves air, assures highest system efficiency. **No silo dust collection port is open except when its chute is operating.**

Let Kirk & Blum — with 50 years experience — solve your intricate dust collection problems.

Write today for detailed information.

THE KIRK & BLUM MFG. CO.
3189 Forrer St., Cincinnati 9, Ohio

10,000 C.F.M. dust arrestor located outside saves space. Collected dust moves to central disposal point by screw conveyor.

For more facts circle 594 on Reply Card

NEW PRODUCTS

(Begins on page 154)

motor are one direct-connected package, facilitating installation. It takes four bolts to fasten the unit to wood, steel or concrete. Bases are for curb mounting, flat or pitched. Chicago Blower Corp.

20—WATER TANK is economical, tripod type

This all-welded, economy-model elevated storage tank utilizes a modern, functional tripod design and is available in small capacities—from 15,000 to 75,000 gal. Standard heights to bottom of the tank range from 25 to 125 ft., depending on capacity. This tripod tank offers easy

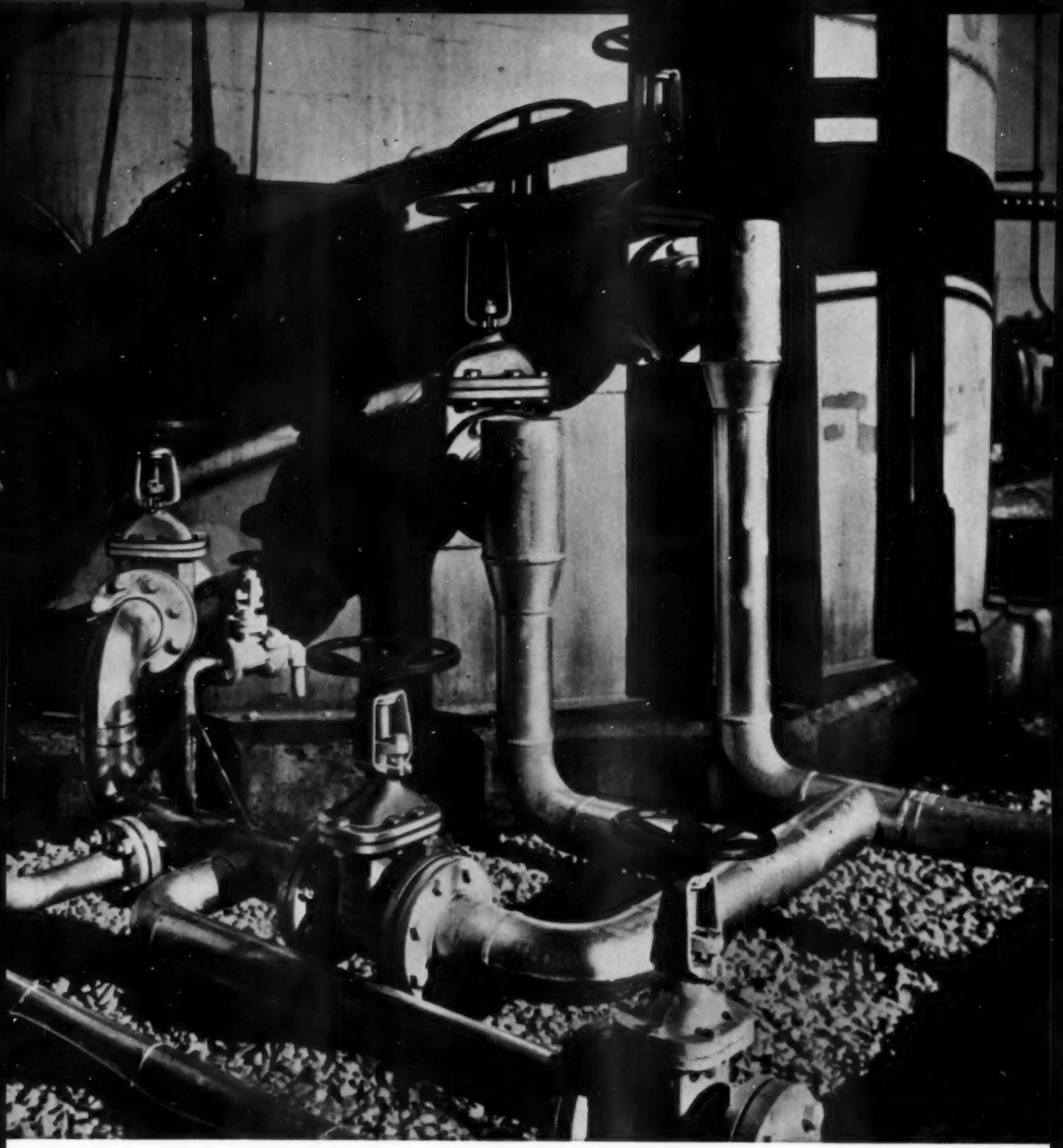
maintenance and other features of an all-welded design, manufacturer reports; and its cost runs considerably less than that of ellipsoidal or hemispherical tanks of equal capacity. Also, its simplified design results in a smaller painting area. Further, the quantity of concrete required for foundation is normally less than that needed for similar capacity elevated tanks of other designs.

The three tripod columns, which range from 8 to 22-in. diam, eliminate the need for sway bracing in the top panel, it is pointed out. The riser pipe is usually 6 to 10-in. in diameter. A frost casing may be used to insulate the riser pipe in areas where freezing might be encountered. Erection of this type of tank is claimed comparatively simple and inexpensive, and its inverted inkwell shape is in keeping with modern building architecture. Chicago Bridge & Iron Co.

21—DIAPHRAGM VALVES with new topworks design

Topworks of the Super 70 Series Diaphragm Control Valves feature a new moulded diaphragm for uniform thrust over full valve travel, pressed steel cases, and a precision-calibrated single spring. Entire topworks is iridited and cadmium plated for corrosion resistance, and is available in direct or reverse acting styles, in four sizes. Valve bodies have streamlined flow contours, top and bottom guided inner valves, all-metal float ring seal designed to provide self-actuating closure and tighten with application of pressure, forged clamp ring that allows yoke orientation to any position, and

For more facts circle 595 on Reply Card



Meet three synthetic detergent experts

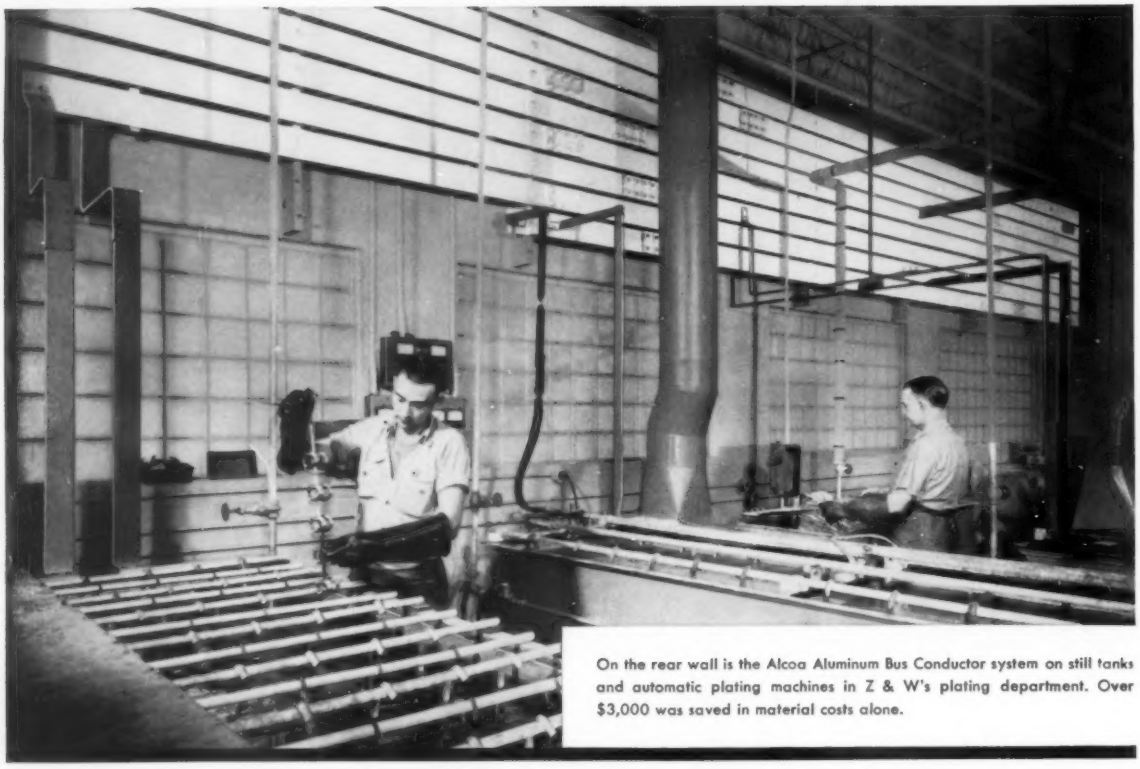
You're looking at a Philadelphia installation of The Atlantic Refining Company (expert #1).

Ultrawet, an important ingredient of synthetic detergents, is the product being processed in this modern plant designed and built by The H. K. Ferguson Co. (expert #2).

Helping to prevent contamination of the product due to corrosion are long-lasting, red-wheeled valves made by Aloyco (expert #3). Made of corrosion-resistant Aloyco 20, the gate and globe valves used here handle a 98% concentration of sulfuric acid at up to 180° F.

Whatever your process, whichever corrosives you need to keep in line, it pays to check first with Aloyco. As the world's largest manufacturer of corrosion-resistant valves exclusively, we're most likely to have the valve you need. Write Alloy Steel Products Company, Inc., 1301 West Elizabeth Ave., Linden, New Jersey. 6.3

Subsidiary of Walworth Company



On the rear wall is the Alcoa Aluminum Bus Conductor system on still tanks and automatic plating machines in Z & W's plating department. Over $3,000 was saved in material costs alone.

$3,000 IN DIRECT SAVINGS

With Alcoa Aluminum Bus Conductor at Z & W Manufacturing

When Z & W Manufacturing Corporation designed their new 130,000 sq ft plant in Wickliffe, Ohio, they wanted equipment second to none—yet costs were closely watched. One of the best of the money-saving acts took place in their plating department.

After a detailed study, they used Alcoa® Aluminum Bus Conductor to carry the 12,000-amp load from individual rectifiers to the six plating lines. Compared to a copper system Z & W got the same conductivity from half as many pounds of metal. Only difference was a slight increase in size. In installing a system using high-conductivity aluminum alloy, Z & W estimates they saved more than $3,000 in direct material costs alone.

Easy fabrication and installation

Other important benefits and savings resulted from aluminum's light weight and easy handling. Also important was the ease of fabrication during their bending and drilling operations. The ½″ x 6″ bars were just bolted to 2 x 8's attached to the wall. Simple insulating washers and wood spacers were used.

Having some small copper bar stock on hand, they used that as leads in some places—other leads were aluminum. Trouble-free joints between copper and aluminum were made, as were all joints, with Alcoa Electrical Joint Compound and aluminum bolts.

Saves 50% on bus conductor

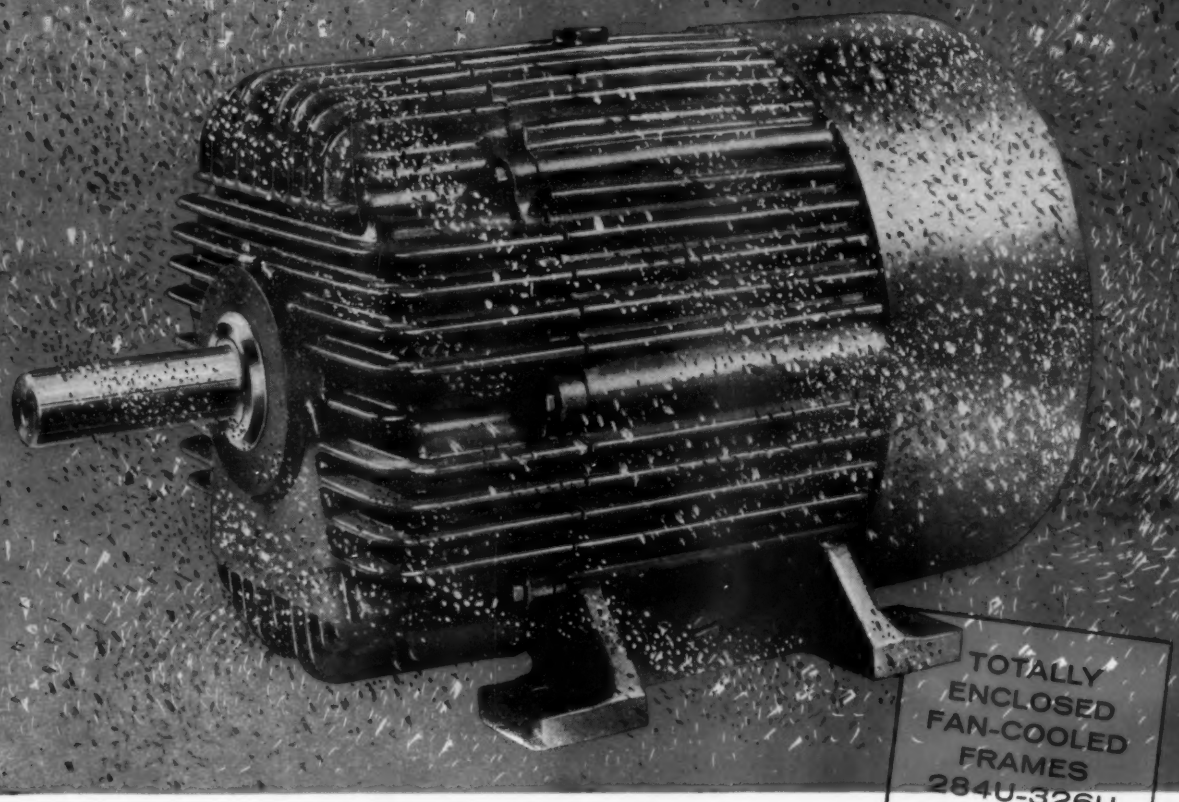
The same technical advice and assistance from Alcoa that enabled Z & W to engineer, design, fabricate and install this bus system are yours for the asking. Study how much you could save with Alcoa Bus Conductor—for expansion or modernization. Cost is about half. Just check the Yellow Pages of your phone book under "Aluminum" for Alcoa's nearest office. Or write, Aluminum Company of America, 2301-L Alcoa Building, Pittsburgh 19, Pa.

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

Your Guide to the Best in Aluminum Value

For more facts circle 596 on Reply Card

Inside and Outside . . . entirely **new**



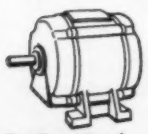
NEW Elliott C-W type N Motor PERMANENTLY SEALED Against Dust, Moisture, Corrosive Fumes

The rugged "Sealedpower" cast frame Elliott motor shown above is the modern version of the design pioneered in this country by Crocker-Wheeler. An external fan, made of sparkless material, and surrounded by a cowl, blows air along the frame for highest cooling efficiency. An internal fan provides continuous air circulation within the enclosure. All openings in the frame are tightly sealed, providing complete protection to windings and working parts.

Once applied only in locations where extremely destructive atmospheric conditions prevail, totally-enclosed motors are today rapidly gaining acceptance for all types of applications. Users find that the total over-all cost—first cost plus maintenance—is less than that of open or semi-enclosed motors.

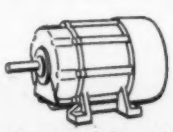
Ask your Elliott representative for details, or write for the new type N motor bulletin. Address Elliott Company, Crocker-Wheeler Division, Jeannette, Pennsylvania.

OTHER C-W TYPE N MOTOR ENCLOSURES



Totally-enclosed non-ventilated

Dripproof Protected



Totally-enclosed, fan-cooled Frames 256 U and smaller

ELLIOTT Company
CROCKER-WHEELER DIVISION

We will be glad to send a copy of this new booklet describing the complete line of Elliott C-W type N motors. Please write on company letterhead.

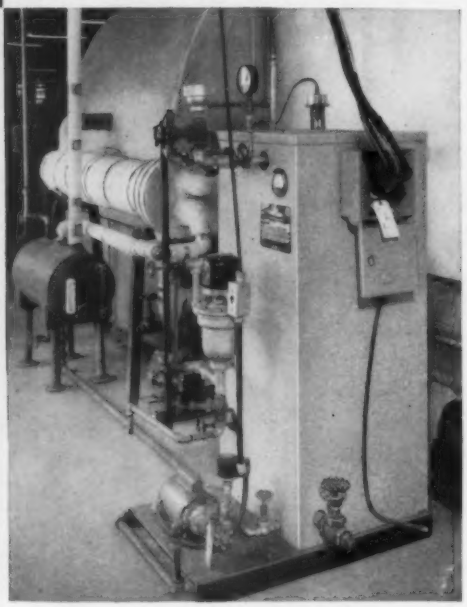
W6-6

For more facts circle 597 on Reply Card

Pantex

Speedylectric Steam Generator

Ideal Steam Source for Production Processes



Speedylectric Steam Generator supplying heat to waxer.

Manufacturing huge quantities of waxed paper containers of every size and shape, a nationally-known company needed a reliable source of heat for a production step in which the new containers are deeply impregnated with a special hot wax. Here, as in many manufacturing processes, a Pantex Speedylectric Steam Generator was the answer.

In the impregnation process, accurate control of wax temperature and submersion time is required for dimensional control of the finished product, complete wax penetration and stability of ink colors. The use of a Speedylectric Steam Generator as a heat source not only assures reliable temperature control at modest cost, but eliminates all danger of fire or explosion . . . serious hazards where the plant atmosphere is often full of particles of waxed paper.

Wherever a reliable, convenient, safe source of steam is needed, Speedylectric Steam Generators serve industry. Using a unique electrode method to generate steam, and easily portable, they require no supervision, operate without flame or fumes, and eliminate the risk of fire or explosion.

WRITE TODAY FOR COMPLETE FACTS AND FIGURES

Speedylectric Steam Jet Cleaners, too, serve industry in countless ways. High pressure jet of dry steam and solvents quickly removes grease and dirt accumulations from machines and equipment without flooding floors. No need to stop nearby production or move machines outside. Completely safe and portable.

PANTEX MANUFACTURING CORPORATION
Box 660AH, Pawtucket 11, R. I.
Send me facts and figures on:
☐ Pantex Speedylectric Steam Generators
☐ Pantex Speedylectric Steam-Jet Cleaners

Name and Title .....

Company .....

Address .....

For more facts circle 598 on Reply Card

NEW PRODUCTS

(Begins on page 154)

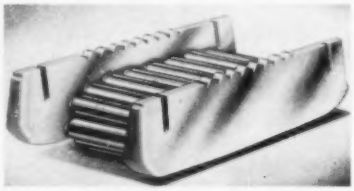
bolted stuffing box with stainless steel followers. Valve bodies come in three styles—single port, double port, and split body for use in erosive or corrosive fluid service where easy removability of valve seat is desirable. Catalog 70-11 gives details. Black, Sivalls & Bryson, Inc.

22—CHAIN WRENCH speeds all kinds of jobs

This line of chain wrenches is designed for rugged use and long life, especially for close corner work on pipe sizes up to 6 in. The wrench jaw is constructed so that the greater the force on the handle, the tighter the grip. Chain will fit round, hex, square and all irregular shapes. Individually boxed, the versatile tools are available in two models, ½ in. to 4 in. and 3 in. to 6 in. They may be used for holding or turning operations and will not scratch or mar surface of pipe or object held, manufacturer claims. The Toledo Pipe Threading Machine Co.

23—ROLLER UNIT moves heavy machinery along

The Express Roller works on the principle of caterpillar action. There are two main components: a series of moving rollers locked in an endless track and

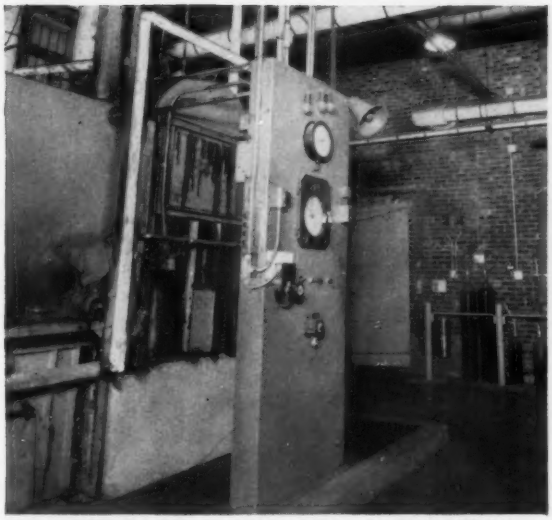


extending above and below a heavy steel frame. The frame, which contains serrated edges, grips and carries the work load being moved. Available in five ranges of sizes from 2- to 150-ton capacities, Express Rollers are priced from $25 to $175. Added accessories include a revolving base plate mounted on ball bearings, which locks onto the roller chassis to permit easy turning of the load. Industrial East Co.

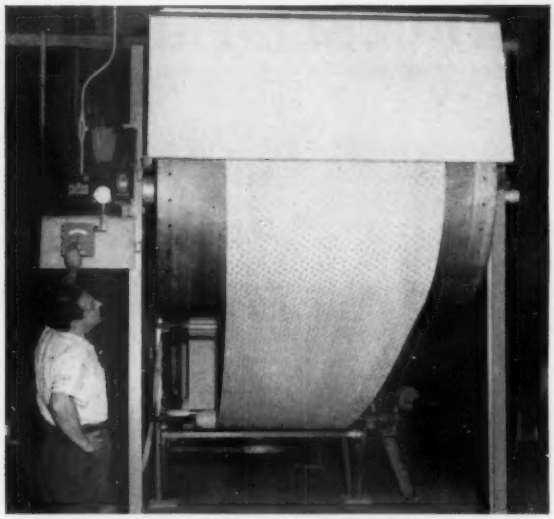
24—COLD ADHESIVE for the wood block floors

An improved type of Blockset is announced for fast resetting, repairing and resealing of wood block floors. The material is factory-mixed and ready to use. Because it is applied cold and eliminates heating kettles, there is neither fire hazard nor obnoxious fumes, it is pointed out, and floor repairs can be done in sections without interrupting production. Blockset is claimed easy to use. Repair work is done by first coating the floor base with Blockset, dipping the blocks in Blockset, inserting blocks in the floor and filling the cracks with the material. For resealing, you spread Blockset over the

Four ways to make a better product with Fenwal units



MEASURING LIQUID LEVEL IN A HOT ASPHALT TANK. High temperature and extreme viscosity of asphalt were no problem for THERMOSWITCH units in this unique application devised by engineers at the Flintkote Company. The Fenwal THERMOSWITCH units were not affected by these severe conditions, which interfere with the operation of most liquid level instruments. *Write for latest literature.*



CONTROLLING A RADIANT HEAT DRYING DRUM. A Fenwal Series 541 Indicating Temperature Controller is connected by a capillary tube to the temperature-sensing bulb, located close to the exterior surface of the drum. The Series 541 keeps the temperature of the drum surface within ± one-quarter per cent of the controller scale — outstanding performance for processing equipment of this type. *Write for latest literature.*

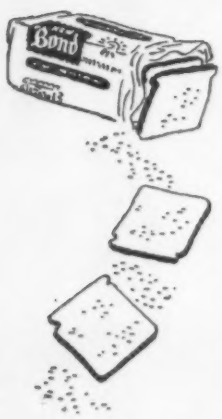
PREVENTING COLD STORAGE DOORS FROM FREEZING. Jamison Cold Storage Door Company's heating unit "Frostop" uses a Fenwal 17000 THERMOSWITCH unit to control the heater and prevent excessive icing. The THERMOSWITCH unit's external, single-metal shell expands or contracts *instantly* with temperature changes, making or breaking enclosed electrical contacts. Compact, highly resistant to shock and vibration, this unit has solved hundreds of costly problems. *Write for latest literature.*

CONTROLLING GENERAL ELECTRIC-TELECHRON TESTING TEMPERATURE CHAMBER. Fenwal's highly flexible Series 560 Indicating Controller controls a specially constructed chamber used for testing. The temperature range of the chamber is 45° to 105°F. In a recent test of Telechron's electronic clock the Series 560 was set on proportional control and controlled the temperature within a degree of the visual setting! *Write for latest literature.* **Fenwal Incorporated, 3911 Pleasant St., Ashland, Mass.**

Fenwal Controls Temperature... *Precisely*

For more facts circle 599 on Reply Card

BAKING PLANT RECEIVES 29 YEARS OF TROUBLE-FREE GAUGING



Reliability is a *must* in industrial gauging. That is one reason why Liquidometer quality gauges are specified in a wide range of industries where liquids are stored and measured.

The Liquidometer gauge installation at General Baking Company's Brooklyn plant is typical. It takes close to 7000 gallons of fuel oil per week to run the baking ovens, generate steam and heat the plant. Here, the important job of fuel gauging has been successfully performed by the same Liquidometer Senior gauge uninterruptedly for 29 years.

Dependability, low-maintenance, high readability, safety and ease of installation suit Liquidometers for your liquid gauging needs.

A variety of dial type Liquidometer gauges are available for direct and remote indication. For complete details write Dept. D.

LIQUIDOMETER INSTRUMENTS

Liquids worth storing are worth measuring

THE LIQUIDOMETER CORP.

SKILLMAN AVENUE AT 36TH STREET, LONG ISLAND CITY 1, N. Y.

For more facts circle 600 on Reply Card

NEW PRODUCTS

(Begins on page 154)

entire surface with a squeegee. It dries quickly says manufacturer — can be trucked over within an hour. The material is also claimed water resistant. The Monroe Co., Inc.

25—ACOUSTICAL TILE looks like stippled plaster

Fresco Acoustical Tile is announced as a non-combustible tile with the appearance of stippled plaster. It has an attractive rough finish and when installed gives the appearance of a monolithic ceiling. It has high noise reduction qualities, says company, yet it offers something different in the way of design, and is available in the same price range as other Fiberglas acoustical tiles. It comes in 12-by-12 in. and 12-by-24 in. sizes with butt joints, and is so manufactured that it can be installed either on a concealed mechanical suspension system or adhered directly to the underside of any surface. Furnished in white, it may be spray-painted. Owens-Corning Fiberglas Corp.

Use the Reader Service Cards provided on pages 229-230 to ask for more information on these products. Circle item numbers of products in which you are interested.

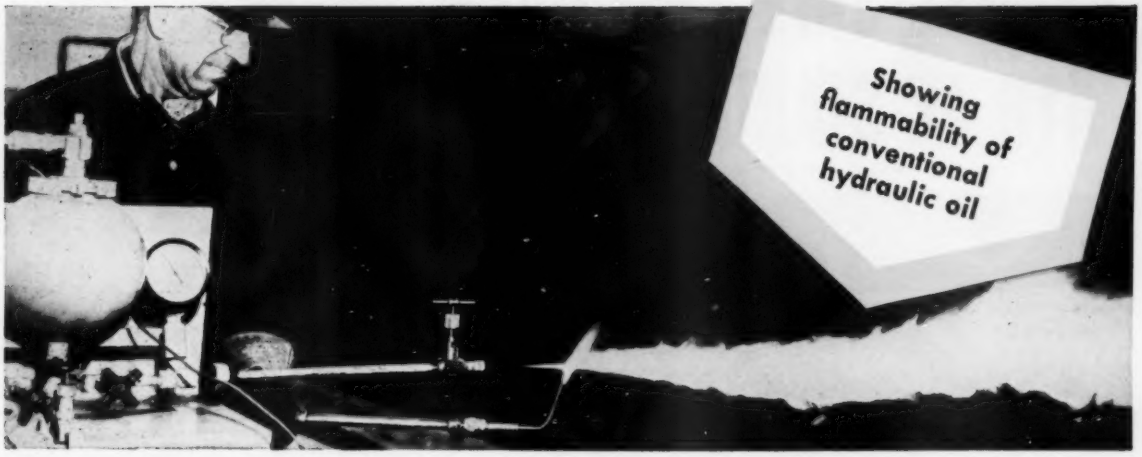
26—PRIMING SOLUTION for use with coal tar coatings

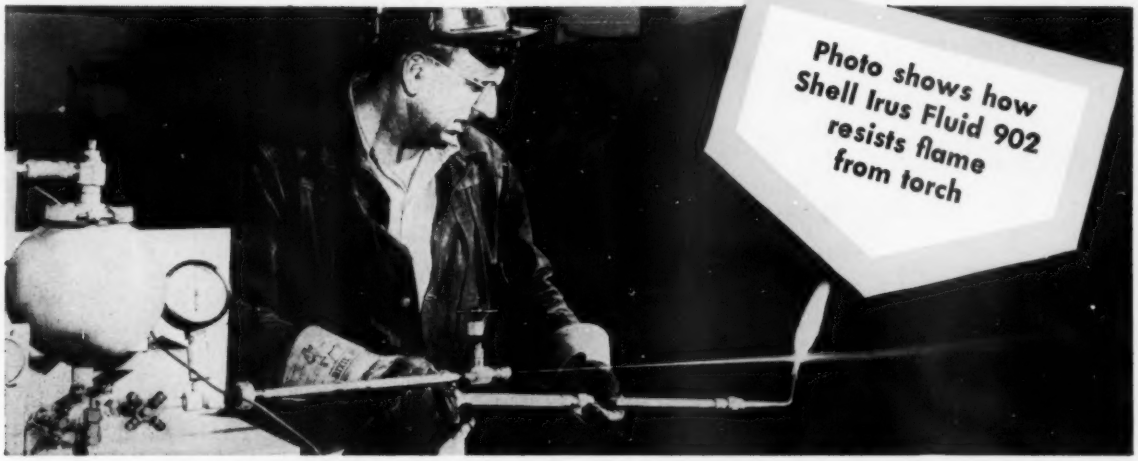
TC Primecoat is announced as a priming solution developed especially for use with company's coal tar protective coatings. It is designed to give users a primer that is compatible with the coal-tar-pitch base used in these protective materials, it is pointed out. TC Primecoat is available in 1-gal cans, packed 2 gal to the carton. According to company, coverage is 400 sq ft per gallon. The Tapecoat Co.

27—SAFETY SHUTOFF needs no sensing element

This impulse monitor is announced as a shutoff and alarm for automatically controlled processes; it requires no sensing elements or electronic circuitry. It is designed to provide a complete, safe shutdown of process and sound an alarm in event of controller failure in the "on" period; and an alarm in event of abnormal "off" period or fusing of power contactor. Although present models are designed primarily for heat treating furnaces, company says principle can be applied to any process involving heat, pressure or flow where the control system uses an on-off, two position or pulsing type of control mode and where input is of reasonably uniform duration.

The device operates independently of





Flame tests prove its fire-snuffing ability

SHELL IRUS FLUID 902

Entirely new formula: Shell Irus Fluid 902 is a special formulation . . . product of three years' development and field testing. It is suitable for nearly all industrial hydraulic systems, as a direct replacement for presently used oils. *Here is a fire-resistant hydraulic fluid that can be widely used.*

Non-corrosive: Shell Irus Fluid 902 contains no corrosive ingredients. It has no harmful effects on seals, fittings or bearings. It does not promote rust.

No major modification necessary . . . simply clean present fluid thoroughly out of system and replace directly with Shell Irus Fluid 902. You can use it with complete confidence. Write for test data and all information.

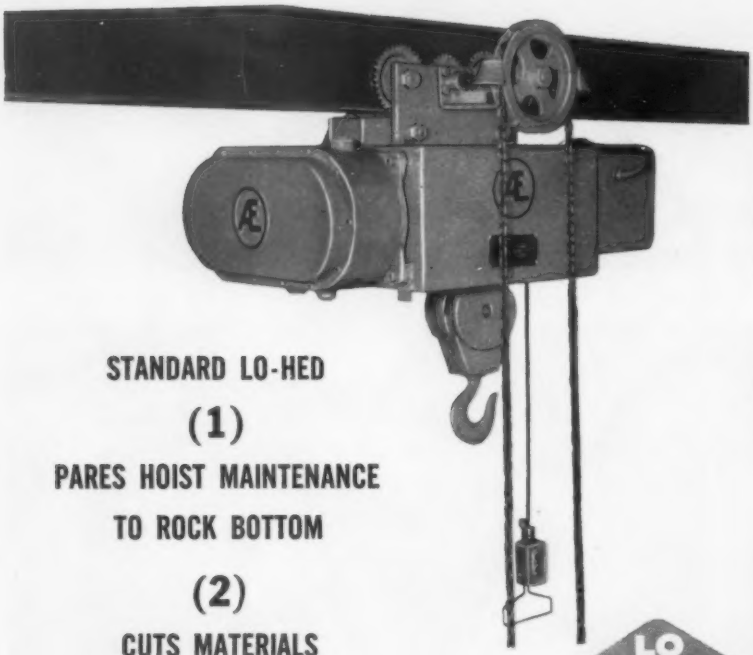
SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

For more facts circle 601 on Reply Card

YOU'LL SAVE TWO WAYS WITH AE STANDARD LO-HED



STANDARD LO-HED

(1)

PARES HOIST MAINTENANCE TO ROCK BOTTOM

(2)

CUTS MATERIALS HANDLING COSTS

LO HED

NORTH, EAST, SOUTH AND WEST, plants are enjoying new economy and efficiency with AE Standard Lo-Hed. Many users have reported *no downtime* during two full years of rugged operation. This heavy-duty machine is built to serve industry years at a stretch—and to cut materials handling costs to new lows.

Available in 2- and 3-ton models and in a choice of trolley suspension types, Standard Lo-Heds have a lower limit safety switch and a 110-volt pilot circuit for voltages of 220 volts and up at no extra cost. All-steel welded construction combines light weight and rigidity.

Immediate delivery from stock in most models... Or, if you have *special* heavy duty requirements, AE's feature-packed Customized Lo-Hed could be the perfect answer. It's engineered in capacities from ¼-ton to 12 tons, and in five suspension types... Contact your local AE representative and see how either the Standard or the Customized Lo-Hed can solve your materials handling problems.

AMERICAN ENGINEERING COMPANY

DEPT. H-164, WHEATSHEAF LANE & SEPVIVA ST., PHILADELPHIA 37, PA.
Canadian Subsidiaries: Affiliated Engineering Corporations, Ltd., Montreal, P. Q.... Bawden Industries Ltd., Toronto, Ont.

AE products are: Taylor, Perfect Spread and Vibra-Grate Stokers, Hele-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers, Marine Deck Auxiliaries.

For more facts circle 602 on Reply Card

NEW PRODUCTS

(Begins on page 154)

furnace temperatures. Operation is a direct function of the signal from automatic controller. According to manufacturer, it continually monitors input to controlled process, and acts instantly to shut down process and sound an alarm when abnormal conditions arise. It can be wired to operate an external alarm circuit or to signal failure over telephone lines or protective agency equipment. A toggle switch permits by-passing monitor during initial process rise and during erratic charging of process. Monitor must be reset manually after each shutdown, permitting check on cause of failure. Priced comparably to existing safety devices, monitor is reported effective on electric, gas or oil furnaces. Catalog 256 gives more details. Damol Corp.

28—PLASTIC LACQUER restores fiber glass panels

New lustre for weather-dulled fiber glass plastic panels is promised by this plastic lacquer. Called Resolac, this air-drying lacquer, when applied directly to surface of panel, is claimed to restore most of the original lustre and finish which may

have become dull or roughened by exposure to elements. Where desirable, it may be used to deepen the color, reducing light and heat transmission of panel. It can be applied with a low-pressure spray or paint brush. A clean, dry surface is the only preparation needed for application. Because it is composed of a special resinous material, it will not peel, crack, or chip, company says. Surface finish is smooth, and color is said to have the same weathering characteristics as original panel. It is available in clear and seven colors, and sells for about $10.00 per gallon. Resolite Corp.

29—BIN VIBRATOR is small yet powerful unit

"Smaller than a football—with the kick of a mule" is how the company describes its TopDog ER-100 Bin Vibrator. The ER-100 weighs only 25 lb, the smallest vibrator in the TopDog line, but delivers an impact of 275 lb with no more noise than that normally made by an electric motor, it is said. It can be furnished with provision for either fixed or portable mounting. A range of voltages from 110

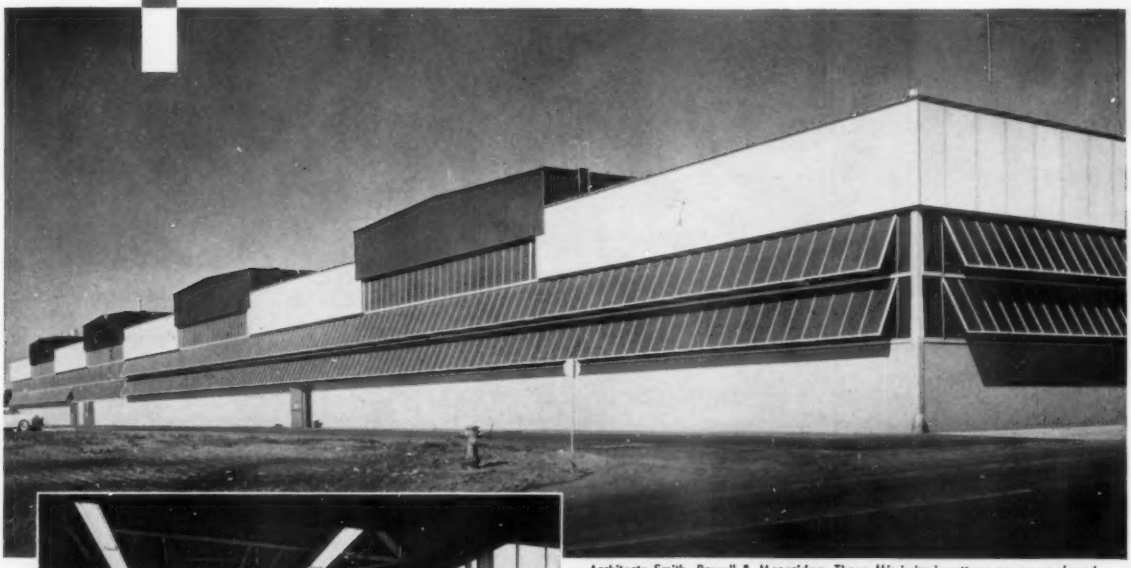
LIGHT and AIR without HEAT and GLARE

Coolite Installed in Top Hinged Windows Floods Factory with Conditioned Daylight

Excellent ventilation and plentiful, eye-easy, natural illumination promote employee efficiency and morale in this United States Electric Motor Plant, Anaheim, California. The hinged windows are glazed with Coolite, Heat Absorbing, Glare Reducing Glass to provide the finest, low-cost daylighting.

Coolite diffuses better light deep into interiors, eliminates contrasts that cause costly visual errors. Coolite absorbs up to 50% of unwanted solar heat rays, helps keep work areas cooler. Employees see better, feel better, work better, under "Cooliting."

This outstanding plant also uses diffusing Wire Glass for excellent daylighting plus protection against breakage and fire in vulnerable areas. Installed in doors, windows, skylights, Mississippi Wire Glass (Approved Fire Retardant No. 32) helps to bottle up small fires . . . keep them from roaring into costly conflagrations.



Architects: Smith, Powell & Morgridge. Three Mississippi patterns were employed in this plant: Coolite, Heat Absorbing, Glare Reducing Glass, 19,212 sq. ft.; Smooth Rough, 5,256 square feet; Coolite Wire, Glare Reduced, 5,377 sq. ft.

Let Coolite brighten your production picture with better daylighting. Specify glass by Mississippi. Available in a wide range of patterns and surface finishes through leading distributors.

Write today for free literature.
Address Dept.13.

MISSISSIPPI
GLASS COMPANY

88 Angelica St. • St. Louis 7, Missouri

NEW YORK • CHICAGO • FULLERTON, CALIFORNIA

see our catalog in S or write for copy

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

For more facts circle 603 on Reply Card

THIS IS THE STORY of three men and a VALVE . Joe , a chemical engineer, needed valves that could handle tough corrosives. Bill , a refining engineer was looking for valves that gave a positive shut-off. Tom , working for a large industrial firm, needed valves that sealed both upstream and downstream . All three solved their problems by specifying Hamer Visible Wedge Valves . These remarkable valves combine the double sealing action of precision metal-to-metal fit augmented by dependable seal rings . The wedges are trimmed with nickel, while seats are trimmed with stainless steel to withstand the roughest corrosive conditions. The full-view wedges are handwheel operated --can't blow out or drop on a toe. The wedges pivot so no lifting is necessary. So if your plans require long service, sure-seal shut-off valves, by all means specify

HAMER VISIBLE WEDGE VALVES .

P.S. For descriptive literature , write:

Hamer VALVES, INC.
2919 Gardenia Ave., Long Beach 6, California
Representatives Throughout the World.
For more facts circle 604 on Reply Card

NEW PRODUCTS

(Begins on page 154)

to 550 with either one, two or three phase current is available. Vibrator is designed for use on bins, hoppers, screens, and chutes, when used industrially and also for efficient concrete casting on pre-stressed concrete work, pipe and tile production, block machines or vibrating tables. Vibro-Plus Products, Inc.

30—3-TON TRUCK has a low silhouette for safety

Developed for operator safety in loading closed highway trucks and trailers, this truck needs only 6 ft of clearance, yet the operator's seat is 38 in. below the mast top. Thus, it is pointed out, even if the operator is over 6-ft tall, his head will be below the top of the mast and not

in danger. Features announced for the Type FTDL-60 Truck include high stability, ease of maintenance, and operator convenience and comfort. There is no cowl, so the operator has a good view of the load and the floor immediately ahead. Also, absence of a cowl makes it easier to mount and dismount, company notes, and the floor plate is clear for the same purpose. Controls, including those for auxiliaries, are reported conveniently located and easy to actuate.

The truck has three braking systems. Service brakes are hydraulic, self-energizing and self-equalizing. Parking brake is actuated by the spring seat. The truck also has dynamic braking with a feature to prevent abrupt reversal of direction while in motion. Baker-Raulang Co.

31—PURIFIER recovers chemicals from vapors, gases

For recovery of valuable minerals and liquids vented to the atmosphere, the Model LUS Hi-eF Purifier separates mist, liquids and solids from gas or vapor by a series of vanes and baffles through application of centrifugal force. Manufacturer says the units are guaranteed to remove 99 per cent of all liquid and solid particles in vapors and gases under normal operating conditions. The purifier has no screens or filters and this permits the design of a much smaller unit, as separation is accomplished in a relatively

NEW CLARK CONTROL CENTERS CAN SAVE YOU ONE VERTICAL SECTION FOR EVERY FIVE!

features:

- SPACE SAVING
- SIMPLER MAINTENANCE
- GREATER VERSATILITY
- MAXIMUM SAFETY
- STRONGER and MORE RIGID

plus!

- CLARK TYPE "CY" STARTERS, OF TIME PROVEN SUPERIORITY

WRITE for your copy of this informative book containing complete information for adapting the new CLARK space-saving CONTROL CENTERS to your needs.

and each section is only 20 inches wide!

You *save space* two ways with new CLARK Control Centers—vertical sections are only 20" wide, and each vertical section can house up to 6 size 1 or 2 non-reversing combination starters. Thus 30 starters can be accommodated in 5 sections—total width only 100 inches—compared with 6 sections of ordinary 5-unit design and considerably greater width. *Maintenance* is easier because all wiring and service—even bus replacement—is from the front or top. Parts are standardized for greatest *versatility* and *flexibility*—making it simpler to adapt units to particular needs or alter arrangements after installation. For *maximum safety*, all bus is completely enclosed and empty compartments are protected by insulating barriers and closure panels. Heavy gauge steel plus exclusive design providing support for all load bearing members without dependence on shear strength of screws, assures added *strength* and *rigidity*.

The **CLARK** **CONTROLLER** *Company*

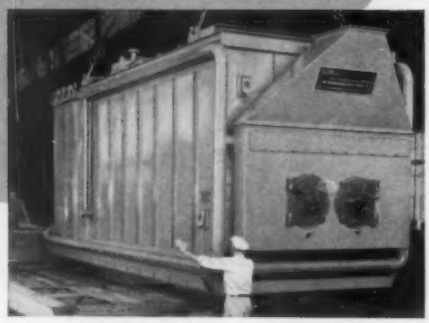
Engineered Electrical Control

1146 East 152nd Street • • Cleveland 10, Ohio

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

For more facts circle 605 on Reply Card

The Swing is to *International-LaMont* for HIGH TEMPERATURE WATER GENERATION



One of (2) 40,000,000 Btu./Hr. packaged HTW Generators being loaded for shipment to Johnson & Johnson, New Brunswick, N.J.

...Over 20 Installations to date,

including industrial, government, institutional and air terminal projects. Here is proof of the unequalled acceptance of International-LaMont Forced Recirculation Generators for the most efficient, lowest cost high temperature water for large area heating, power and process requirements—with these exclusive advantages:

- **NO THERMAL SHOCK** — System return water is circulated through the Built-In Economizer and brought close to saturated temperature by flue gases BEFORE reaching the radiant furnace zone.
- **BUILT-IN ECONOMIZER** permits safe use of maximum available temperature differential between boiler outlet and system return water. Temperature differentials from 175°F. to 200°F. are possible and recommended. Result: lower original equipment and operating costs.
- **LOW HEADROOM BOILER.** Minimum height reduces cost of boiler house construction . . . permits installation in many existing structures.
- **COMPLETE RANGE OF SIZES** from 2 to 200 million Btu per hour or larger . . . design pressures to 500 psi with corresponding temperatures. Pressurized furnace or induced draft operation. Individual boiler circulating pumps or combined pump system if preferred.

Get the Facts. Write for Bulletin 700 today.

IBW 1886-1956

THE INTERNATIONAL BOILER WORKS CO.

Steel Firebox Heating & Power Boilers Low & High Pressure Water Tube Package Boilers • International-LaMont Forced Recirculation Generators • ASME Code Pressure Vessels & Welded Products.

820 Spruce St. East Stroudsburg, Pa.

For more facts circle 606 on Reply Card

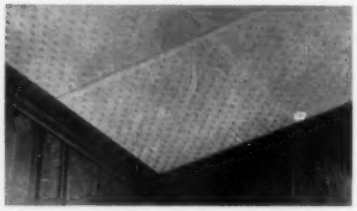
NEW PRODUCTS

(Begins on page 154)

small area by a compact separating element. On gas lines, the separated entrainment is ejected automatically by a float trap, on steam lines by a steam trap. Bulletin 700 describes these units. The V. D. Anderson Co.

32—CEILING UNITS are economical, decorative

Low cost, incombustibility, accessibility and high acoustical value are announced for Hansotex Aluminum Units. Also, they are delicate in appearance and have an embossed pattern in which the openings are "slanted in depth." According to manufacturer, Hansotex has a low initial cost



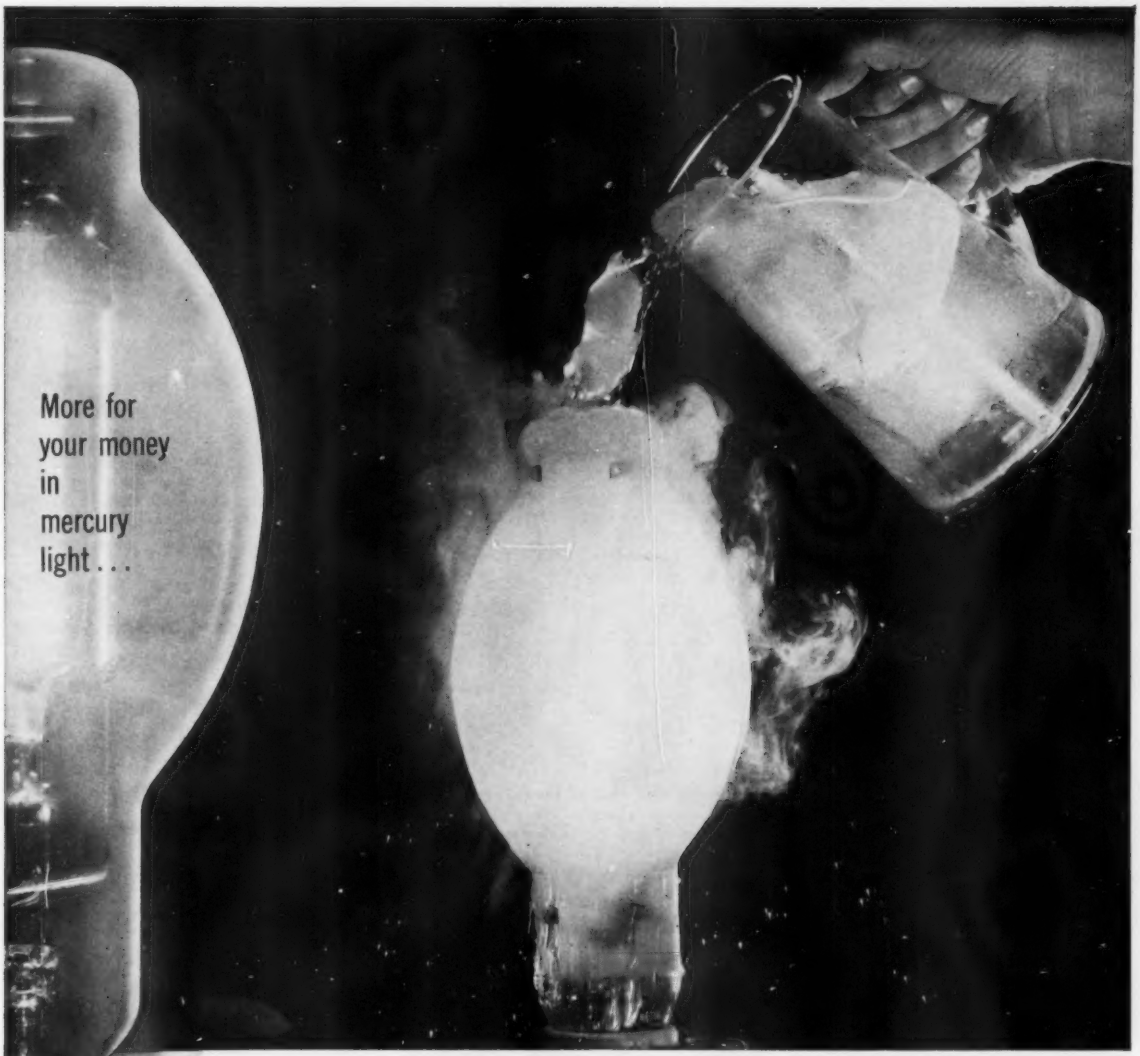
and is inexpensive to install because the nominal 2-by-2 ft unit is simply placed on exposed T-runners, Z-runners. The sound absorbing element, which can be preselected, is permanently bonded to the aluminum face at the factory.

The sealed joints and smooth surface design of Hansotex reduce risk of stains caused by "breathing," it is noted, and the flat aluminum surface, finished in baked enamel, assures easy maintenance. Washing or repainting may be done with units in place or after removal. Hansotex is claimed resistant to moisture, rot, fungus, mildew and termites. The units can be arranged in symmetrical sequence or "broken joint" pattern. Elof Hansson, Inc.

33—CALKING GUN has quick shut-off feature

The Handi-Calk Gun and Cartridge are designed for instant shut-off of calking compound for worthwhile material savings. A major problem with calking has been the difficulty of shutting off the gun when not in use, company points out; normally, calk continues to ooze from the nozzle wasting the compound. With this new gun and cartridge, a quick twist of the hook at the end of the ratchet rod serves to withdraw the piston from the cartridge to stop the calking flow and cut off the calking bead at any point desired.

Key to the operation is the cartridge, which has a plastic diaphragm at its base. When the piston at the end of the ratchet rod is withdrawn, the pressure build-up within the cartridge is released through the diaphragm rather than continuing through the small nozzle opening—thus shutting off the calking from the nozzle. To use the gun, you drop a cartridge into the cradle; no tools are required for loading. For calking, you squeeze the trigger



ANNOUNCING NEW WESTINGHOUSE WEATHER DUTY(TM) MERCURY LAMPS

Down again go your lighting costs as Westinghouse announces another basic improvement in high-intensity mercury lamps. It's the world's first line of *weather-resistant*, heavy-duty mercury lamps.

Made with hard, tough, thermally stable glass, new Westinghouse WEATHER DUTY Mercury Lamps can be burned outdoors unprotected in rain, snow or sleet with no risk of cracking. And they can be burned indoors in ventilated fixtures with no danger of shattering under water drops entering through the ventilating openings. Moreover, they are highly resistant to mechanical breakage and to the corrosive effect of industrial fumes.

Thus in any type of installation—indoor or outdoor—Westinghouse WEATHER DUTY Mercury Lamps save you money three new ways. First, by eliminating the need for protective shields and permitting the use of cheaper fixtures. Second, by doing away with costly shield maintenance. And third, by releasing the large amount of light wasted by dirty shields.

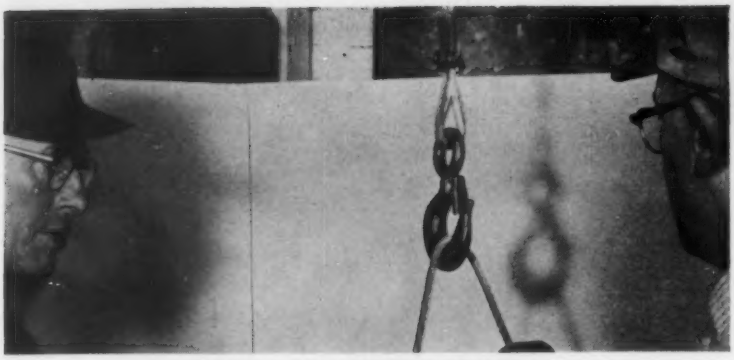
WEATHER DUTY Mercury Lamps are the latest example of how Westinghouse gives you "*more for your money in mercury light.*" Now available types E-H1-WD, J-H1-WD, A-H12-WD, C-H12-WD, A-H15-WD and B-H15-WD.

WESTINGHOUSE GUARANTEES the service life of all its widely used types of quartz mercury lamps. For full details call your Westinghouse Lamp Representative—or write Westinghouse Lamp Div., Dept.PE3, Bloomfield, N. J. "You can be sure if it's Westinghouse."

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU***

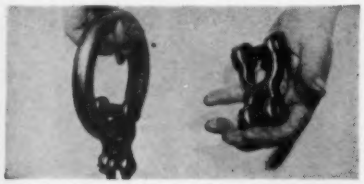
For more facts circle 607 on Reply Card



LOADS STAY PUT!

Anyway you handle it—rough or easy—your load can't come off the hook when your crane or hoist is equipped with a Laughlin Safety Hook! When the load is set down, your sling or ring won't slip off the hook until *you* release it! Designed to strict specifications, the hook is drop forged and heat treated. The fool-proof latch mechanism that maintains maximum throat width is made of long life stainless steel—it'll never rust, never jam!

Non-Sparking Safety Hooks are also available for your hazardous atmosphere applications. Your distributor can give you the complete story.



You'll find Laughlin fittings—the world's most complete line of fittings for chain or wire rope—fully described in the catalog available from your nearby distributor or from the Crosby-Laughlin Division.

TAKE IT (UP) EASY

Big hex ends of Laughlin Turnbuckles make them easy, fast and safe to take up with a standard wrench. Exclusive Laughlin eye design takes the ear of a shackle one size smaller, yet is stronger than conventional eyes because it conforms more closely to the line of pull. This same design feature also makes it easier to attach thimbles and other fittings. You can get Laughlin Drop Forged Turnbuckles in any combination of hooks, eyes and jaws in a complete range of sizes.

SAFETY IS NO SECRET

You're free from worry, your workers free from danger when Crosby "Load-Rated" Crane Blocks are part of your rigging. There's no chance to overload the block by mistake because the load capacity is plainly visible on the side plate! The rated capacity *can't* be a secret when it's in sight! Workers all over the nation are protected by Crosby "Load-Rated" Blocks—are yours?

NEED A SLING FAST?

Time-consuming, expensive welding or blacksmithing is no longer necessary when coupling chains to fittings. You can make slings in minutes at lowest cost by using Laughlin's heat-treated Double Clevis Links. They'll couple ¼" to ½" standard and alloy chains to rings, end and sling links, eye hooks, pad eyes, and other fittings.

Stocked and sold by leading distributors everywhere

CROSBY-LAUGHLIN *Division*

American Hoist and Derrick Company

FORT WAYNE 1, INDIANA

For more facts circle 608 on Reply Card

NEW PRODUCTS

(Begins on page 154)

to provide a smooth, even flow of compound and force the calking into the crevices. A cartridge calks from 15 to 25 lineal feet, depending on size of the opening. A flexible plastic nozzle fits most crevices. The gun weighs only 2 lbs when fully loaded, is claimed ideal for use by women—trigger and grip are designed to prevent pinching during operation. Gibson-Homans Co.

34—STICK-ON LABELS giving wiring repair instructions

These self-sticking labels, mounted on handy zip-off liners or fast-to-dispense rolls, can be applied directly to product to clarify instructions, reduce maintenance time, insure proper operation, show manufacturer's address, warranty and service branches, part numbers. Preprinted labels are made from a rugged, moisture resistant tape which sticks to glass, metal, wood, plastic and painted surfaces and is quickly applied with finger pressure. Made from white flatback stock, these labels have a strong high tack adhesive. Data Sheet 160-1 gives more details. W. H. Brady Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 229-230.

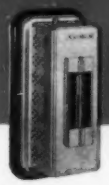
35—MASTIC COATING resists acids and alkalis

Floor-Nu is announced as a mastic coating which resists the acids and alkalis that destroy and eat up mortar, concrete and wood in manufacturing plants. It can be used to resurface existing wood or concrete floors or to patch rutted, splintered or damaged areas in floors or walls in rooms, refrigerators or truck beds, as well as to resurface interior of concrete or steel tanks. It may be used as an acid-alkali resistant grout and to repair deteriorated mortar joints between acid-proof shale brick or tile. Other specifications that have been built into the product are: adhesion, tensile strength and resistance to abrasion; easy application without necessity of heating or use of special tools. Steelcote Mfg. Co.

36—LUMBER DRYER furnished as packaged unit

Designed to speed up and cut cost of drying lumber and wood products, the Dryalator is made up of five components delivered as a packaged unit, assembled and ready for use. It includes steam coils, motor driven air propeller, air return duct system and fresh air intake, steam jet for humidity control, and automatic controls. The improvement in

Clark Equipment
Spends Less for Heating,
Insures Proper Ventilation
with
JOHNSON CONTROL



The rows of closed windows at this modern Clark Equipment Company* plant illustrate a means of saving money that is readily available to any industrial building. Here, just a simple application of Johnson Thermostats, Valves and Damper Operators is all it takes to provide comfortable, healthful working conditions and eliminate the needless heat waste of "open window" ventilation.

Strategically located Johnson Thermostats direct the operation of six 20,000 cfm heating and ventilating units. In order to maintain the desired temperatures throughout the 150,000 square foot structure, thermostats compenstate for the heat-producing effects of equipment used in fabricating and assembling operations as well as for the effects of changes in outdoor temperatures. Outdoor air for ventilation is then heated only enough to maintain the correct space temperature.

There's no underheating and, more important, no overheating to require wasteful "open window" ventilation. Both temperature and ventilation needs are fully satisfied at the lowest possible fuel cost.

Additional space temperature control is economically provided by other Johnson Thermostats which regulate face and by-pass dampers on nine door blast heating units.

The successful performance of this money-saving system led to further installations. Since the building was completed in 1954, Johnson engineers have been called on to design the automatic control systems for both a small and large addition to the plant, a new two-story office building and a smaller, field office building.

Whether it's comfort control you need or protective temperatures and humidities for products and processes, the specialist Johnson organization has the answer. An engineer from a nearby Johnson branch will gladly demonstrate how, on your specific problems of heating, cooling, and ventilation control, Johnson can give you superior control performance and reduce your operating costs. No obligation, of course. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

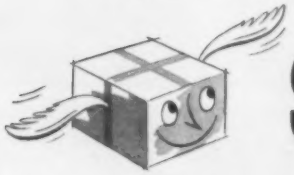
*Clark Equipment Company, Construction Machinery Division, Benton Harbor, Michigan. The Austin Company, engineers and builders, Chicago.

JOHNSON CONTROL
SINCE 1885

PLANNING • MANUFACTURING • INSTALLING

For more facts circle 609 on Reply Card

Cutaway shows one of two hydraulic jacks which raise and lower Truck Leveler.



SPEED LOADING ...SAVE DOCK SPACE

Rotary Truck Leveler raises or lowers truck bed to dock level for speed, safety and economy

This modern hydraulically-operated loading dock device speeds all usual loading methods and also equips docks to handle "containerized" shipments and similar new developments in cargo handling.

The Rotary Truck Leveler raises or lowers the trailer to bring the bed level with the loading dock. This eliminates sharp, dangerous inclines and permits fastest loading and unloading with any type of materials handling equipment. The Truck Leveler platform, supported by two oil-hydraulic jacks, has a capacity of 40,000 lbs. and vertical travel of 28". It will handle highway carriers of any size.

Recessed into the pavement in front of the truck loading dock, the Rotary Truck Leveler takes no space. Dock platform is completely free of obstructions. Operation is by dependable, economical Rotary Oildraulic electric power unit. Easily installed at new or existing loading docks. Mail coupon for more information.

Rotary

TRUCK LEVELER

Manufactured by Rotary Lift Co.
MEMPHIS, TENN.-CHATHAM, ONTARIO
Division of the Dover Corporation

MAIL FOR CATALOG

Rotary Lift Co.
1155 Kentucky,
Memphis 2, Tenn.

Send complete data on the Rotary Truck Leveler to:

Name_____

Address_____

_____

For more facts circle 610 on Reply Card

NEW PRODUCTS

(Begins on page 154)

drying made possible by the Dryalator as compared to many kilns, is said to enable the drying of lumber in a fraction of the time required to dry the same quantity of lumber by evaporative process. A further advantage cited is that even small plants with lumber in their end products can buy green lumber and dry it. Orr & Sembower, Inc.

37—WALL PARTITION for flexible interiors

This divider wall partition for creating semi-private office units from open floor space is offered in two types—unglazed, at a height of 43 in. from the floor, including legs; and glazed, at a total height of 66 in. from the floor, with a 4-in. space between bottom of all panels and floor. Standard panel widths are 36, 48, and 60

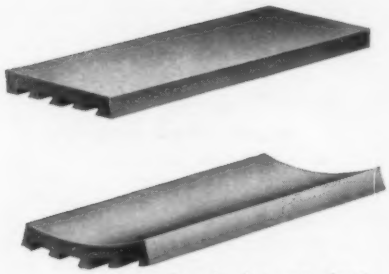
in. The 24-in. high glazing is offered in many clear and diffused glass patterns. Plastic glazing strips permit insertion and removal of glazed panels without danger of chipping or damage, company says, and assure a rattle-free, tight fit. A total of 24 compatible color combinations are possible using three standard colors offered—pale green, light grey, and tan. Gates only are also offered in coral. All metal parts are finished in low-gloss, baked enamel, said to require no repainting, only periodic washing. Snap-in attachment of panels permits easy installation. A leveling device compensates for floor irregularities, and wiring channel for electrical outlets at bottom of panel is optional. The E. F. Hauserman Co.

38—STEAM COILS with special tilted feature

This line of heavy duty, distributor type steam coils has a special tilted feature to assure drainage of condensate, whether used for vertical or horizontal air flow. Cover pieces at header and stub ends are perforated to allow passage of measured amount of by-pass air, resulting in increased coil capacity. Coils are pitched in casing to assure full drainage to condensate outlet, and designed so that every square foot of face area produces equal heating capacity on full or modulated steam supply. Coils are available with inlet and outlet on same end or on opposite ends, and can be supplied with gas tight casing. They have tubes of ⅝ in. OD by 0.035 in wall copper. Stainless steel coils

Amvit CLAY LINER PLATES *resist abrasion*

provide smoother flow, added protection



Standard size 9" x 24"
Other sizes upon request

● For *complete* protection of concrete pipe sewers, industrial sewers, culverts, acid vats, sewage treatment tanks, neutralizing baths and laboratory and industrial walls and floors choose and use *Amvit* clay liner plates.

They are specially manufactured to meet all application requirements which entail resistance to acids, alkalies and chemical reaction.

Amvit clay liner plates, hardened, glazed, smooth, acid-proof and durable, permanently bond and lock to masonry and concrete work. They install easily to concrete forms and are sized according to standardized specifications for uniform spacing.

For more information, write or call for our detailed booklet on Amvit liner plates. American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you.

102" reinforced concrete pipe lined with Amvit curved clay liner plates being installed in a combination storm and sanitary sewer.

SINCE 1900

AMERICAN

American Vitrified Products Company

CLEVELAND, OHIO

MANUFACTURERS of: Clay pipe, flue liners, clay liner plates and concrete pipe.

Plants Across the Nation... Brazil, Indiana • Chicago, Illinois • Cleveland, Ohio • Crawfordsville, Indiana • Detroit, Michigan • East Liverpool, Ohio Fenton, Michigan • Grand Ledge, Michigan • Lisbon, Ohio • Los Angeles, California • Milwaukee, Wisconsin • South Bend, Indiana • Uhrichsville, Ohio

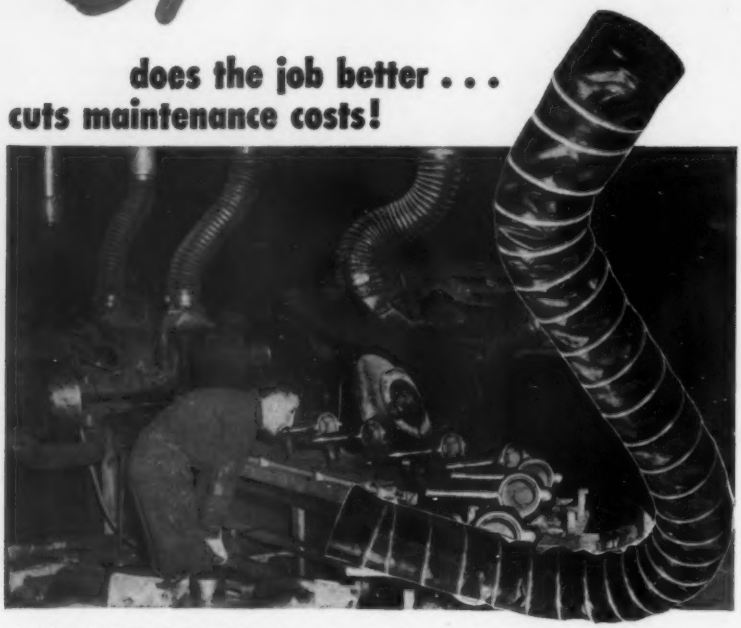
For more facts circle 611 on Reply Card

For Removal of Dust, Fumes, Gases, etc.,

flexible

Spiratube

does the job better . . .
cuts maintenance costs!



Lightweight Spiratube® is the answer to many an application where fume removal, ventilation and dust problems are concerned. Because of its patented preformed helical wire support design, Spiratube "springs to work" and stays extended even on tight turns . . . costs less to install and maintain—downtime is reduced to a minimum—and Spiratube can snake around and over obstructions, eliminating the use of costly elbows and fittings.

Spiratube is ideal for portable and semi-permanent applications. Sections can be linked together or detached in a matter of seconds without the use of tools. If machine changes are made, Spiratube can be assembled and disassembled and reused over and over again.

Spiratube is available in sizes from 3" to 30" in a variety of covers. Investigate this low-cost method of air or dust handling today. Stocks are available from leading distributors across the country. For further application information about this product, please send coupon below.

Flexible Tubing

CORPORATION

GUILFORD, CONNECTICUT • LOS ANGELES 64, CALIFORNIA

Flexible Tubing Corporation, Dept. 9N, Guilford, Connecticut
Please send me illustrated catalog and more information on Spiratube.

Name _____

Title and Company _____

Address _____

City _____ Zone _____ State _____

For more facts circle 612 on Reply Card

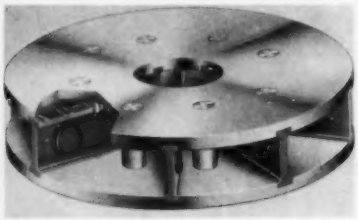
NEW PRODUCTS

(Begins on page 154)

are available. Aluminum fins, tubes are high tensile brazed to headers, and casings are 14-gage steel. Sizes range from 12 in. to 48 in. face height and from 24 to 120 in. width. Rempe Co.

39—THROWING WHEEL for airless blast cleaning

This type of wheel for centrifugally propelling abrasive in airless blast cleaning is currently available for use on airless abrasive blast cleaning equipment already installed in plants, as well as on machines being manufactured. Called the GM



Wheel, it is available in the 2½ in. wide by 19½ in. diam size. The wheel reduces maintenance costs resulting from wear, it is said, by a new method of holding wheel blades in the wheel. Instead of a set screw and set screw bushing, the GM Wheel employs a simple spring arrangement. This locking device is not in the abrasive blast stream nor subject to appreciable wear. According to company, it can be inserted or removed with a common tool like a screw driver. Blades are heat treated alloy steel for longer operating life. All components of the wheel assembly, except blades and locking devices, are interchangeable with components now in use on older wheels. Wheelabrator Corp.

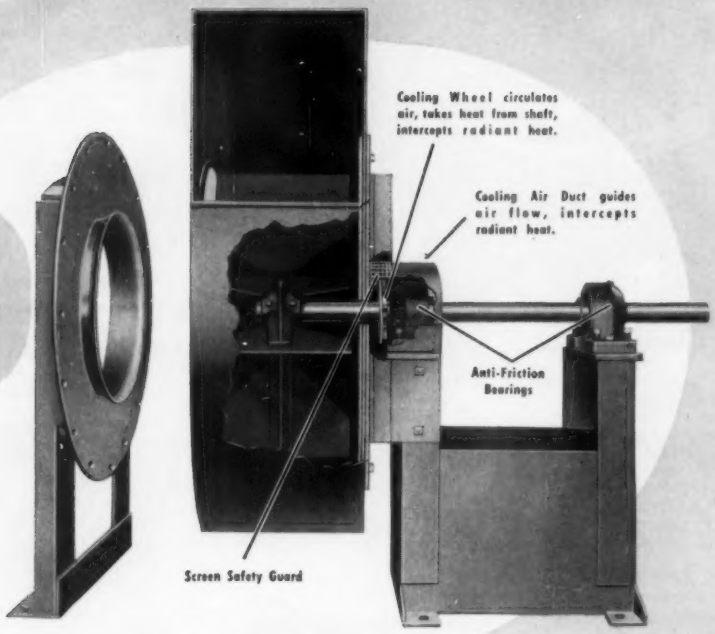
40—WALL CONSTRUCTION offers simple installation

Fenestrawall is designed to incorporate simple installation details and make use of intermediate windows along with porcelain or other type panel inserts. Frame finishes include Bonderized prime-painted or bright Fenlite finish which, it is said, never requires maintenance protective painting. Porcelain inserts can be furnished in almost any color desired, with two-toned effects and high gloss finishes available. Company says that this type of construction gives greater flexibility in design of modern, functional buildings. In addition, it is claimed to enable faster, more efficient building methods in the field. Fenestra Inc.

41—DRUM HANDLER fits those up to 1000 lb

One man can safely handle drums weighing up to 1000 lb with the Model 66 Drum Handler, it is claimed. Positive locking action clamps chime of standard 30- and

WANT TROUBLE-FREE
high temperature air handling?


Cooling Wheel circulates air, takes heat from shaft, intercepts radiant heat.
Cooling Air Duct guides air flow, intercepts radiant heat.
Anti-Friction Bearings
Screen Safety Guard

New Clarage Type XL Fan shown in "opened up" view is typical of the sizes which provide universal discharge.

MONEY-SAVING SOLUTION:

Clarage's new Type XL Fans equipped with AIR Cooled Bearings!

FOR TEMPERATURES UP TO 750° F., here's a simple, dependable, inexpensive feature available on standard Clarage fans. Costlier water cooled bearings NOT required. By all means, on your next "hot" job consult the Clarage sales engineer about this money-saving optional feature.

The new Clarage Type XL Fan — with its advanced design — offers many other important advantages in industrial air and material handling.

Learn about the high efficiency, rugged construction, and in-the-field adaptability of this exceptional fan equipment by requesting Bulletin 702. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

NOTE: For heavier-duty service or temperatures above 750° F., this and other types of Clarage fans can be provided with water cooled bearings.

You can Rely on...

CLARAGE

Headquarters for Air Handling and Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 613 on Reply Card

RUGGED...
but extremely SENSITIVE!

PARTLOW TEMPERATURE CONTROLS are built to withstand rough usage, but they're also extremely sensitive to slightest temperature changes. They'll take a lot of punishment without upsetting their accuracy and precision.

If your process requires precise temperature control in the –30°F to 1200°F range, you can do it better . . . *and at lower cost* . . . with Partlow Controls.

They're less complicated than thermocouples. Thick-walled capillaries and seamless tubing assure almost indefinite life. Elements can be replaced on the spot.

What's your control problem?

Tell it to Partlow!

THE PARTLOW CORP., Dept. PE-1156
New Hartford, N. Y.
Offices in All Principal Cities

SEND FOR THIS **FREE** CONDENSED CATALOG

MODEL LS
Indicating Temperature Control

MODEL RS
Recording Temperature Control

partlow
the pioneer in mercury thermal controls

NO MATTER WHAT YOU MAKE, PARTLOW CONTROLS WILL HELP MAKE IT BETTER

For more facts circle 614 on Reply Card

NEW PRODUCTS

(Begins on page 154)

55-gal drums with up to 2500 lb pressure for upright transportation of liquids, small parts, chips and refuse in open or closed end drums or those with removable head. To use this handler, you roll it to the drum, move clamp handle to rear position, lift the load with the hydraulic pump and ram without changing position behind the handler. The load is always in balance, says manufacturer, and slipping or tripping is eliminated. A narrow turning radius makes the Model 66 suited for use in crowded plant aisles, loading docks. Coolant Equipment Corp.

42—SWIVEL NOZZLE for fast bulk material loading

Designed to augment the rapid pneumatic loading of Airslide cars, bulk vans, and Truck-A-Bins, this swivel nozzle consists of a bent aluminum tube approximately 2-ft long and 3 in. in diam., fitted

into a standard or custom designed aluminum hatch cover. Equipped with a rubber gasket, the hatch cover, when fitted to hatch, provides an air-tight seal, preventing escape of bulk material being loaded into transport unit. According to manufacturer, nozzle enables loader to get maximum amount of material into vehicle and evenly distribute material within. In operation, operator first opens hatch and fits nozzle into opening. After securing cover to hatch he aims nozzle to one end of car. This is done by positioning a 4½ in. handle on straight section of pipe above hatch cover. Pipe can be turned 360 deg. Nozzle is designed basically for loading flour, but can be used to load other materials. Fuller Co.

43—EPOXY HARDENER for potting and encapsulation

Specifically designed for use with Sonite XI, an epoxy resin casting compound used in potting and encapsulation, Sonite No. 23 Epoxy Resin Hardener gives a number of unusual and desirable combinations of properties to the epoxy resin and the potted component. It is designed to give long pot life and low viscosity to the uncured mixture and flame resistance and good mechanical and thermal shock resistance to the final component, with no variation in the good electrical properties charac-

AN INDUSTRY FIRST!

the Boltaron

Registered Trademark, The General Tire & Rubber Co., Akron, Ohio

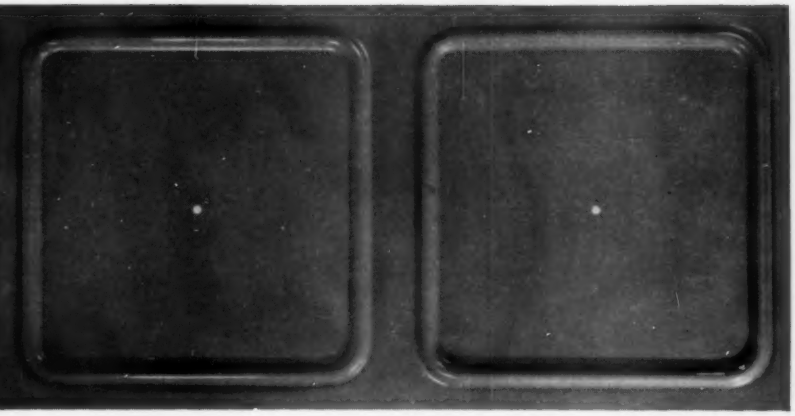
6200 unplasticized PVC (type I)

EXPANSION SHEET

(patent applied for)

INDUSTRY'S ONLY CORROSION-RESISTANT TANK LINER WITH BUILT-IN THERMAL COMPENSATION

Most successfully combines the high corrosion resistance of BOLTARON 6200 Type I unplasticized PVC with industry's increasing demand for larger size tanks and greater allowable temperature differentials.



NEW DESIGN PRINCIPLE

The BOLTARON EXPANSION SHEET, 30" x 60" x 3/16", utilizes corrugations which more than fully compensate for expansion and contraction both in length and width. Since each BOLTARON sheet is an individual unit, contraction and expansion is confined to the unit itself. Thus the problems of buckling, warping and other distortion usually encountered in other types of lining are virtually eliminated.

VERSATILE AND EASILY INSTALLED

The BOLTARON EXPANSION SHEET can be used with tanks of wood, new or even badly corroded metal, concrete, or practically any other material. It can be used in any size tank — square or rectangular.

For further information write for Bulletin 4EL.

H. N. HARTWELL & SON, INC.

Industrial Plastics Division, Park Square Bldg., Box 311, Boston 16, Massachusetts

The only integrated source for Unplasticized PVC Materials

PIPE · FITTINGS · VALVES · RODS · BARS · SHEETS · CUSTOM APPLICATIONS

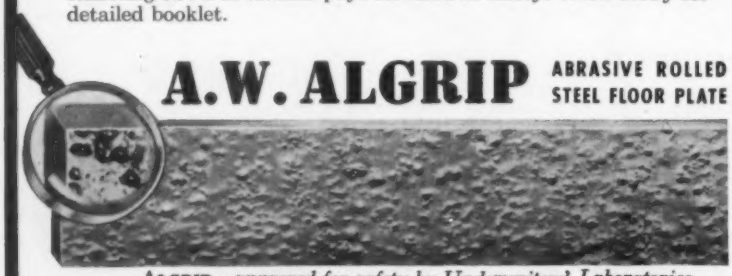
For more facts circle 615 on Reply Card

The Accident did NOT happen
thanks to A.W. ALGRIP
World's only abrasive rolled-steel floor plate

Under the most treacherous slipping hazards—water, oil, grease, ink mist—ALGRIP's thousands of tiny abrasive friction particles provide super-safe footing.

This remarkable morale-building flooring—made by a patented process—is tough rolled steel floor plate into which a grinding-wheel type abrasive has been rolled to a uniform controlled depth as an integral part of the steel. Wear and tear merely expose more abrasive. Fabrication is easy and maintenance practically nil.

Make a test installation as an overlay or complete flooring in your worst slipping area. Watch accident and insurance rates go tumbling down as ALGRIP pays for itself in safety. Write today for detailed booklet.



A.W. ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

ALGRIP—*approved for safety by Underwriters' Laboratories*

ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

Please send A.W. ALGRIP Booklet AL-29

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Other Products: A.W. SUPER-DIAMOND Rolled Steel Floor Plate—Plates—Sheets—Strip—(Alloy and Special Grades)

For more facts circle 616 on Reply Card

NEW PRODUCTS

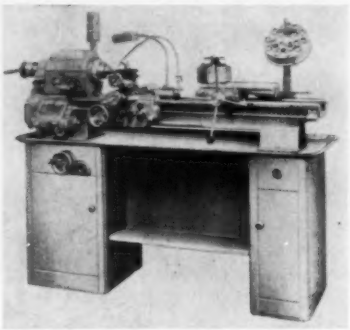
(Begins on page 154)

teristic of epoxy materials. Sonite 23 is a low viscosity amber liquid that mixes readily with Sonite XI at room temperatures. It cures at 250 F in 2 hr. Parts may be removed from mold after an hour of curing. The cured epoxy resin is reported to have a heat distortion temperature of 72 C, to be rated self-extinguishing as to flammability and to pass Type B thermal shock test. Smooth-On Mfg. Co.

Reader Service Cards on pages 229-230 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

44—ENGINE LATHE converts to production unit

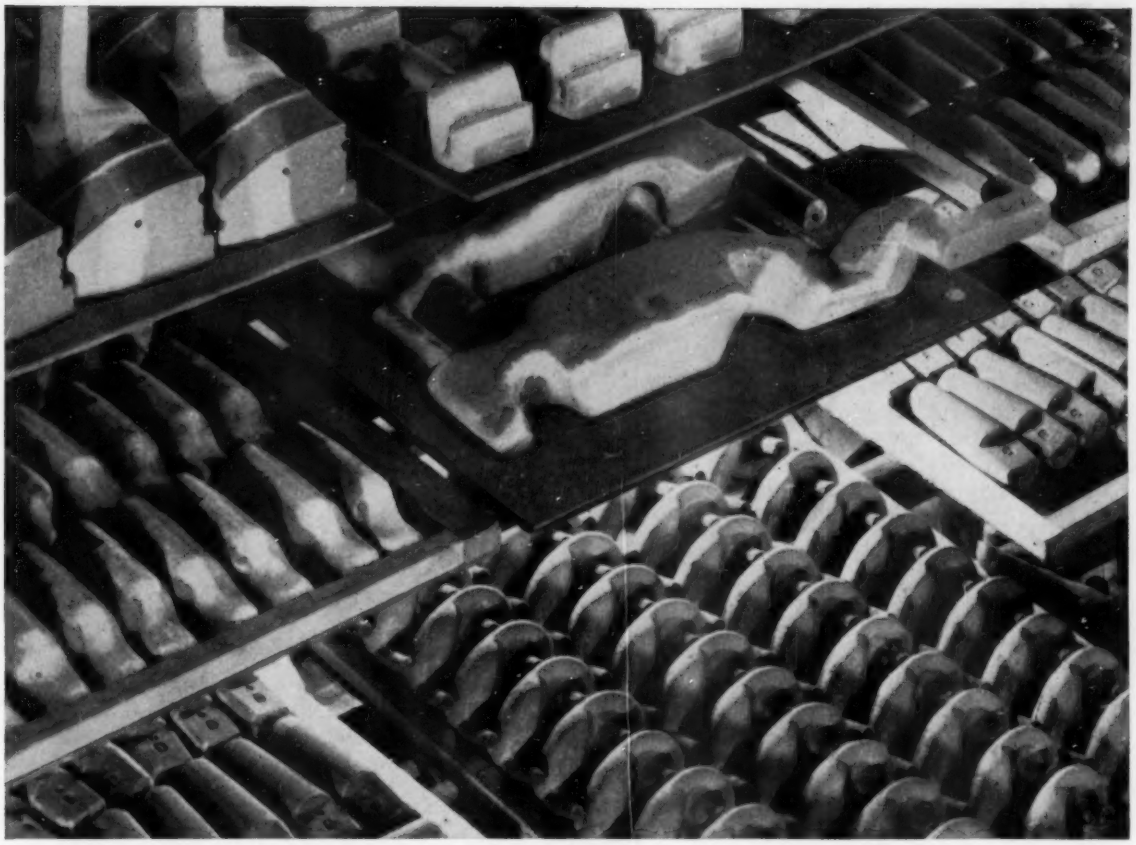
Four new accessories will convert this company's 11-in. metal-working lathe into a turret lathe, it is announced. All four—including a bed turret, turret tool post,



lever-type collet closer and coolant group—fit both the 4 and 5-ft models of the lathe. With the accessories, this lathe can be used on the production line for precision manufacturing as well as in toolrooms, maintenance departments as an engine lathe—the purpose for which the tool was originally designed. As modified by these accessories, the lathe is suggested for manufacture of duplicate parts and for primary and secondary machining operations. Delta Power Tool Div., Rockwell Mfg. Co.

45—LUBRICANT for high temperature applications

MP Hi-Temperature Lubricant is reported to solve problems caused by wide ranges of operating temperatures, pressures and loads. Relatively unaffected by temperature change, this lubricant does not thin out up to approximately 600 F, says manufacturer—at that point it is transformed from a fluid to a gas. As a



You tote and store things better with MASONITE TEMPERED PRESDWOOD

Where to use Tempered Presdwood for carrying and storing

- Pallets and trays
- Tote boxes
- Push trucks
- Shelves and racks
- Storage bins
- Troughs and chutes
- Conveyors

The slick, smooth way to carry small parts—without damage. The easy way to handle heavy castings—efficiently. Make tote trays and pallets of sturdy, rigid Masonite® Tempered Presdwood®.

Never a splinter or sliver to get under a worker's skin. These panels are grainless and knot-free! Dense and tough, they stand up to some mighty rough handling!

It's easy to put Tempered Presdwood to work. Cuts and fits like wood. Every square inch is usable. In thicknesses of 1/8", 3/16", 1/4" and 5/16". See your lumber dealer. Send the coupon for more ideas about Masonite products in your plant.

MASONITE® PRODUCTS

MASONITE CORPORATION
Dept. PE-11, Box 777, Chicago 90, Ill.

Please send me your booklet on improving factory methods with Presdwood.

Name.....
Title.....
Firm.....
Address.....
City.....*State*.....
Zone.....*County*.....

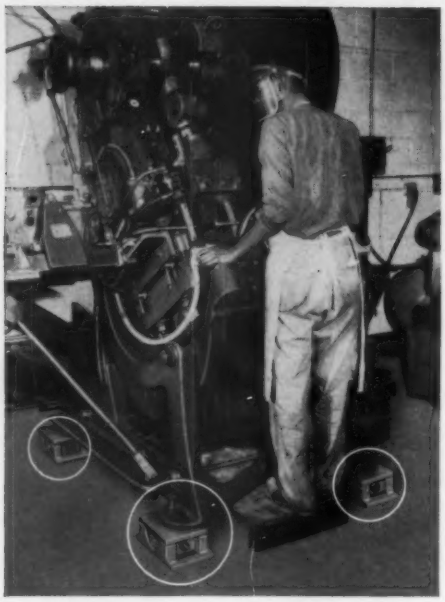
® Masonite Corporation
manufacturer of quality panel products.

For more facts circle 617 on Reply Card

KORFUND VIBRATION CONTROL

Stops NOISE Complaints

Increases Employee Efficiency



This large punch press, installed on an upper floor, had both neighbors and employees complaining about shock and noise—the rubber mounts used by the company just couldn't do the job. Korfund engineers recommended mounting the press on four Steel-Spring Vibro-Isolators. This was speedily done—since the Isolators' built-in leveling screws eliminate shims, and lagging to the floor was not necessary. The neighbors' complaints stopped immediately, and employee efficiency increased.

Of course, all our installations are not as critical as this—on some, the major requirements are eliminating foundation bolts and leveling the equipment. In cases such as these, plant engineers are enthusiastic about Korfund LEV-ELASTO Dampers—the lowest cost adjustable leveling mount on the market.

Solving vibration control and machinery mounting problems is Korfund's specialty. We have more than a half-century of experience in the field. Our experience lets us recommend "the right way the first time"—no trial-and-error basis is necessary.

All Korfund products are designed to provide equipment mobility by eliminating bolting equipment to the floor, and to provide leveling where necessary.

Reserve your copy of the booklet "The Plant Engineer's Guide", coming soon. Write for Bulletin 29.

For specific recommendations contact us or one of the 46 local Korfund offices. Look under "Korfund" in your local Telephone Directory or in Thomas' Register.

THE KORFUND CO., INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

48-35R Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

For more facts circle 618 on Reply Card

NEW PRODUCTS

(Begins on page 154)

result, there is said to be no build-up of deposits to cause mechanical difficulties. At lower temperatures (-60 F) it does not tend to congeal, it is noted, but stays fluid and lubricates.

The new lubricant is also claimed effective when applied to bearing surfaces subjected to heavy pressures and loads. It maintains a constant film of lubrication between bearing surfaces, it is explained, to form an absorbed, inert, tenacious seal that resists the throw-off tendency of centrifugal action. Company says it is free of chemicals and compounds which might attack metal surfaces or alloys. Tower Oil Co.

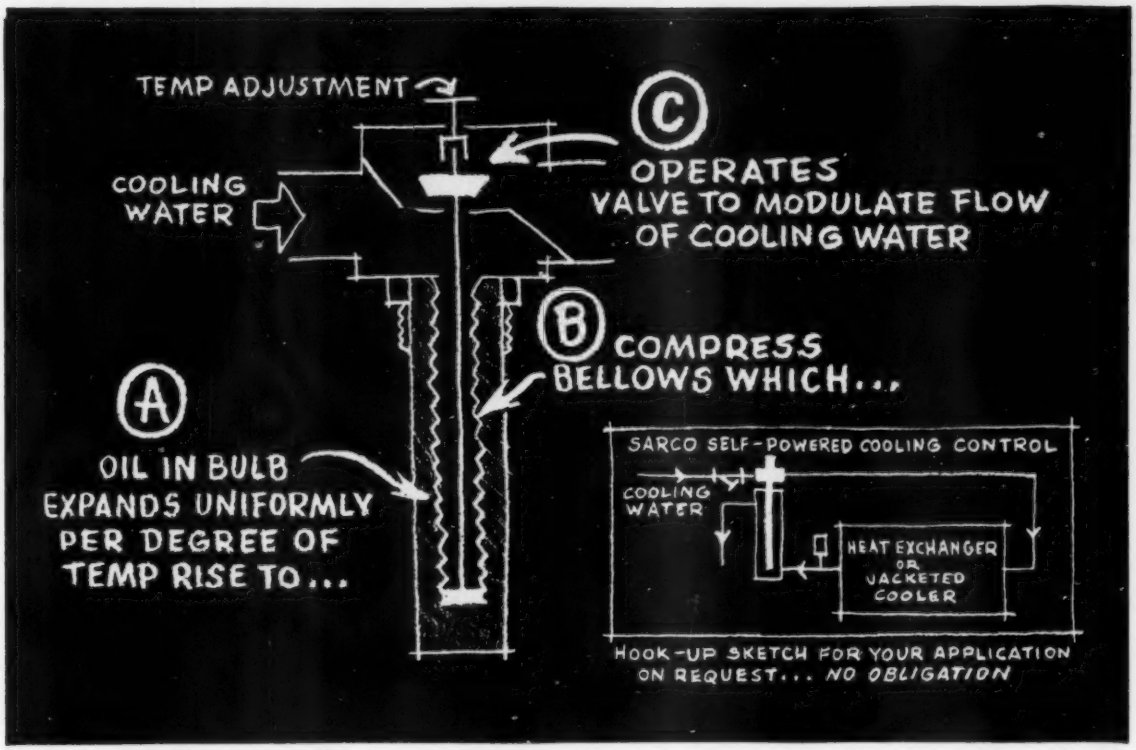
46—SUMP PUMP is light in weight, air operated

This air operated sump pump, is rated at 340 gpm against a 10-ft head. It is available in either steel or bronze, with the latter for use in pumping acid or corrosive liquids. Features announced for the

pump, which operates with a maximum head of 95 ft, include light weight construction, low air consumption, a governor-controlled motor, and a built-in lubrication system. According to company, it is ideally designed for removing water or other liquids from tanks, sumps, ditches, manholes, or traps. Pump has a base diameter of 8 in., is 23 in. high, and has an air inlet of ¾ in. diam, while discharge outlet is 2½ in. diam. The pump requires no priming. The steel model weighs 56 lb, bronze 75 lb. Le Roi Div., Westinghouse Air Brake Co.

47—FLOOR TRUCKS made of non-rusting metals

These new stainless steel, galvanized steel and aluminum bin-type floor trucks will not rust or corrode, it is noted, and will absorb neither moisture nor odors. They are announced as ideal for the textile, chemical, paper manufacturing and food processing industries. Although available in many sizes, the most common size is 48 in. long by 36 in. wide by 24 in. deep. The top has continuous rolled edges and two corrugations encircle the box to stiffen it. Bumpers on the front


TEMP ADJUSTMENT
COOLING WATER
C
OPERATES VALVE TO MODULATE FLOW OF COOLING WATER
B
COMPRESS BELLOWS WHICH...
A
OIL IN BULB EXPANDS UNIFORMLY PER DEGREE OF TEMP RISE TO...
SARCO SELF-POWERED COOLING CONTROL
COOLING WATER
HEAT EXCHANGER OR JACKETED COOLER
HOOK-UP SKETCH FOR YOUR APPLICATION ON REQUEST... NO OBLIGATION

Simple, inexpensive way to end waste and hazards of overcooling

WHEN cooling water is manually controlled ...the operator is forced to play it safe by leaving the water valve wide open to compensate for variables in the load and water pressure and temperature. Result—*overcooling*. If he tries to vary the flow of water...he risks *undercooling*.

It pays to take responsibility off the operator's shoulders. Optimum *safe* temperature can be automatically assured by using Sarco Cooling Controls. They eliminate both overcooling and undercooling. They replace guesswork with certainty. Save man-hours and cooling water. Prevent damage to equipment.

Simple and Trouble-Free

Simple, trouble-free design—as you can see above, a temperature control need not be complicated! Self-powered...no electricity or compressed air required. Self-contained...no exposed mechanism. Packless...no packing to wear or leak.

Each year, thousands of these fully modulating and sensitive Sarco Controls provide dependable service for firms such as Ingersoll-Rand, Butler Manufacturing Co., and Swift & Co.

Low Price

The low price makes it possible for you to use Sarco AUTOMATIC temperature controls for ALL control jobs, not just the big ones! For example, the ¾" size costs only about $39! Mail the coupon now.

SARCO

Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.
Please send information on your simple, inexpensive Self-Powered Cooling Controls for use on_____

Name_____
Firm_____
Address_____
City_____ State_____
2155-B

For more facts circle 619 on Reply Card

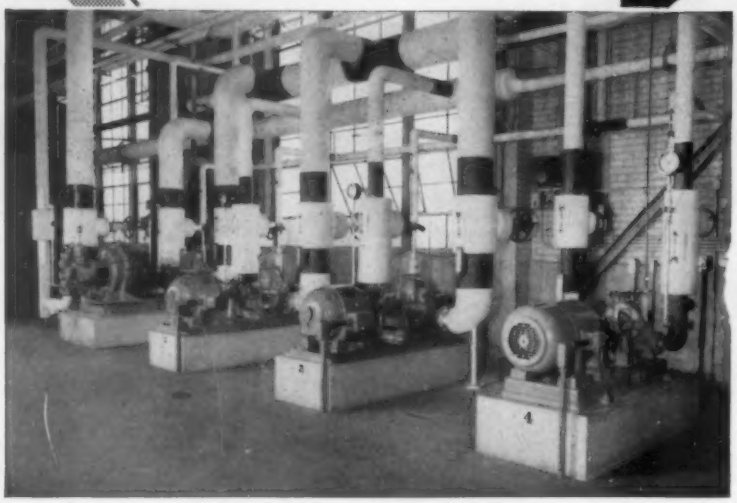
dependable

. . . or else!

Boiler Feed Pumps, like these four Warren Pumps shown at the new, ultra-modern North Grafton, Massachusetts, Heavy Press Forging plant of

WYMAN GORDON COMPANY

must always be available for round-the-clock operation—if and when necessary.



Photograph, courtesy Wyman Gordon Company. Other Warren Pumps in this plant include Condensate and Fuel Oil Transfer.

These experience-rated Warren Pumps, and thousands of others in the power plants of important and vital industries, are built with substantial plus factors as to dependability, low maintenance and economy.

BOILER FEED, CONDENSATE, FUEL OIL BURNER AND OIL TRANSFER SERVICE . . . there are types and sizes of Warren Pumps that will meet your requirements and live up to their reputation for dependability, minimum maintenance, economical operation and long life.

WARREN QUIMBY PUMPS

P-33

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC.

Warren, Massachusetts

For more facts circle 620 on Reply Card

NEW PRODUCTS

(Begins on page 154)

and back prevent accidental damage to the truck body. Easy pushing is provided by roller-bearing 12-in. diam center wheels and 8-in. diam rigid end wheels. Other types of steer such as trailer type and caster type are also available. A corrugated drain bottom is optional. Lewis-Shepard Products, Inc.

48—ELECTRIC SWEEPER works 8 hr without stopping

Model 605-E is announced as a battery-powered industrial sweeper that does a full day's work without stopping, sweeping up to 70,000 sq ft of open area per hr. Sweeper can work an 8-hr shift before it needs recharging because it operates on two motors, company explains, one powering the vehicle, and the second, the brooms

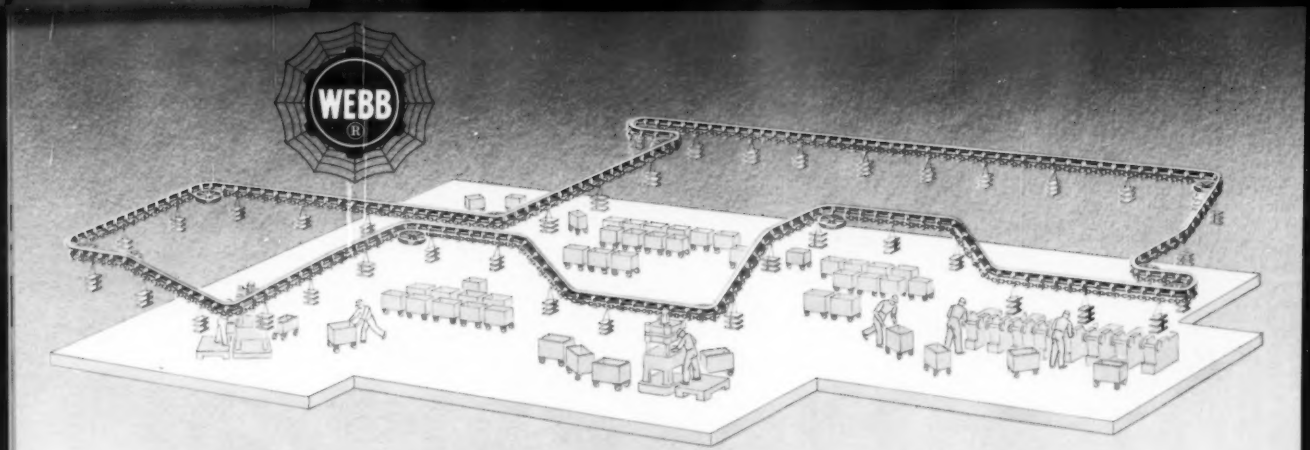
and dust control system. When traveling but not sweeping, only the motor is used, thus saving batteries. A built-in battery charger makes recharging a matter of plugging into a 110-v outlet. Three-speed forward transmission with one speed in reverse is said to provide gear ratios for most efficient performance under all sweeping conditions, including steep grades.

Sweeper is designed with an eye to applications where quiet and fume-free operations are needed, such as the food, chemical, and pharmaceutical industries. Features include "Filter-Vac" dust control, eliminating need for a dust bag which must be emptied. Dust is deposited in main dirt hopper before entering fan. When full, hopper-load is dumped in a compact pile hydraulically without driver leaving seat. The 36-in. pickup broom is mounted on self-aligning sealed ball bearings. Side brooms are available for left or right, or both sides. Wayne Mfg. Co.

49—INSTRUMENT handles pressure and temperature

Type 57 Pneumatic Recording Controller controls and records both pressure and temperature. Available models have either 9 or 12 in. spring or electric driven charts and on-off, duplex on-off or 1-100 per cent proportional action. Pressure ranges

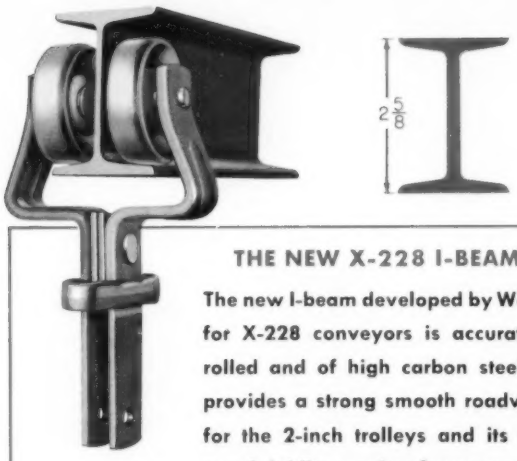
For more facts circle 621 on Reply Card →



This Webb Lightweight Conveyor processes chrome parts from trim presses through buffing operations. Overhead system provides a constant re-circulating inventory. Eight other X-228 Conveyor's are used in conjunction with one above to provide a complete overhead handling system.

WEBB X-228 CONVEYORS

Lower Your Costs *for* Handling Light Loads



THE NEW X-228 I-BEAM

The new I-beam developed by Webb for X-228 conveyors is accurately rolled and of high carbon steel. It provides a strong smooth roadway for the 2-inch trolleys and its unusual rigidity requires fewer support members. X-228 I-beams are comparable in their high quality to 3, 4 and 6-inch beams used for heavier-duty Webb conveyors.

A large parts manufacturer is benefiting by handling chrome trim parts on nine Webb 2″ trolley conveyors. Combined length of installation totals more than 4000 feet. Uneven production rate formerly created a bulky storage and inventory problem. Now, overhead conveyors provide recirculating inventory flow . . . eliminate floor congestion . . . open up additional space for other manufacturing operations . . . greatly reduce manual handling. Parts flow is automatically controlled, constant and efficient.

This lightweight 2″ trolley conveyor is designed specifically for the efficient and economical conveying of small or light parts (trolley capacity up to 75 pounds). Users achieve manufacturing efficiency without paying the cost of a heavy duty conveyor. How about your manufacturing operations? Do you have a handling problem involving light parts? If so, Webb X-228 is the right conveyor for you.

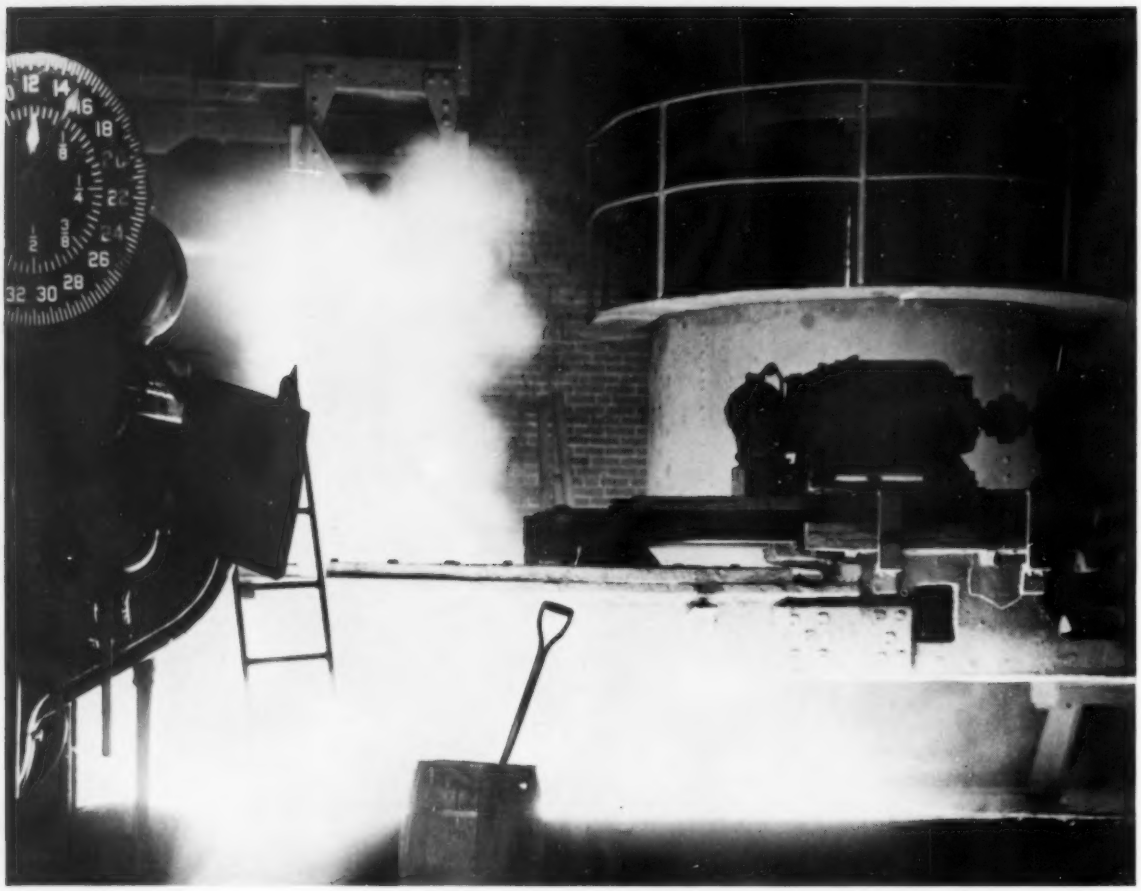
Webb also makes trolley conveyors in larger capacities to handle heavier loads. Many other types of Webb conveyors are available for efficient handling of any product or material regardless of bulk, weight or size. For more information on the lightweight X-228 conveyor, or any other Webb conveyor, contact the Webb District Office near you, or write direct.

JERVIS B. WEBB CO.

Specialists in Custom Conveyor Systems

8933 ALPINE AVENUE • DETROIT 4, MICHIGAN

FACTORIES: DETROIT • ATLANTA • LOS ANGELES • HAMILTON, ONTARIO, CANADA • ENGLAND • FRANCE • AUSTRALIA



Rome Synthinol 901 was developed specifically for industrial "hot spots" like this

Here's the ideal wire for your hazardous-duty locations, where you must have *exceptional* resistance to heat, oil, and chemical hazards.

Rome Synthinol 901 is a superior thermoplastic compound that resists more industrial hazards than any other PVC (polyvinyl chloride) compound. That's been proved in more than one industrial "hot spot."

In Refineries. At bulk loading stations, Rome Synthinol 901 has been continuously exposed to the damaging effects of heat and oil, and its inherent resistance to both enabled this wiring to outlast all other PVC wiring.

In Chemical Plants. Explosion is a real hazard in plants where hydrocarbon oils are processed. The oil resistance of Rome Synthinol 901 offers valuable protection against this hazard.

In Manufacturing. Equipment manufacturers have their "hot spots," too—for example, coil leads in transformers. These coils are immersed in oil over long periods at continuous operating temperatures of 90° C. or higher. Rome Synthinol 901 not only withstands the corrosive effects of this hot oil but also doesn't contaminate the oil.

For 600-volt service under extreme conditions of heat, moisture, corrosive fumes, oil or chemical corrosion—or combinations of all of these—Rome Synthinol 901 outperforms all other comparable PVC thermoplastic wires.

Strong claims? To be sure, but you can prove them to yourself by testing this tough wire in your own plant or laboratory.

Specify Rome Synthinol 901 for your own particular "hot spot."

Contact your nearest Rome Cable representative for further information—or write to Department 643, Rome Cable Corporation, Rome, New York.

ROME CABLE

CORPORATION

For more facts circle 622 on Reply Card

"We have no operating problems when we use STANOIL Industrial Oil"

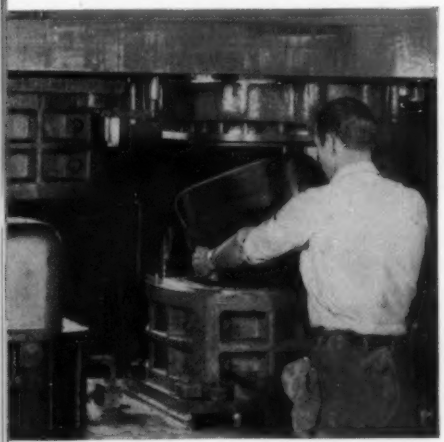
Midwest Metal Stamping reports results of 8 years of press operation using STANOIL

Don Foster, Midwest Stamping Purchasing Agent and Jesse Nelson (right), Standard Oil industrial lubrication specialist, display metal blank and finished tub turned out on Bliss press. Technical service on lubrication problems is Jesse Nelson's job. He's been doing such work for seven years. Jesse has an engineering degree from the University of Iowa and is a graduate of the Standard Oil Sales Engineering School. Customers find this experience and training pay off *for them.*

In 1948, Midwest Metal Stamping Company, Kellogg, Iowa, put into service a Bliss Hydro Dynamic Press. STANOIL Industrial Oil was selected as the hydraulic medium. The initial fill was 1,400 gallons. The press operated continuously from 1948 until Christmas, 1954, when it was shut down five days for overhaul.

At the time of overhaul, the STANOIL Industrial Oil was drained. And here STANOIL's superior demulsibility was demonstrated. Due to the high rate of condensation, two barrels of water were removed from oil reservoir. An oil analysis in the Standard Oil laboratory proved the oil still suitable for continued service. After filtration, it was returned to the reservoir and the press put back in operation. STANOIL continues to deliver the same perfect performance for Midwest as before.

STANOIL Industrial Oil can perform just as efficiently for you. Find out. There is a Standard Oil industrial lubrication specialist near you in any one of the Midwest and Rocky Mountain states. Call him. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.



Stamping being removed from press by operator George Johnson. Press has used STANOIL Industrial Oil as hydraulic medium for eight years. Oil has perfect performance record.

STANDARD OIL COMPANY
(Indiana)

For more facts circle 623 on Reply Card

STANDARD

You've Got A Date In November at the

22nd NATIONAL EXPOSITION of POWER & MECHANICAL ENGINEERING

(Under auspices of ASME)

NOV. 26-30, 1956
In New York's New Coliseum

You and your key men have a date at one of the most important exhibitions of power progress anywhere, anytime. For many executives, production men and engineers, it will be the most profitable five days of the year. Every aspect of power—its production, its use, new techniques, new economies will be on view in hundreds of exhibits (including Atomic Energy) in the country's newest showplace—the Coliseum.

There is no more effective and profitable way of keeping up-to-date on what's new and different in the power field than to attend this exposition. And there is no more comfortable place to see it in than the new Coliseum.

Plan now and act now—write for advance registration for you and your key men to:

22ND NATIONAL EXPOSITION OF POWER & MECHANICAL ENGINEERING
480 Lexington Ave., New York 17, N. Y.

MANAGEMENT: INTERNATIONAL EXPOSITION COMPANY

3509

NEW PRODUCTS

(Begins on page 154)

from 0-5 to 0-5000 psi (0-25,000 psi for 12 in. single pen only) and temperature range is from -350 to 1200 F. Type 58 Recorder records pressure and temperature, both in the same ranges as Type 57 recording controller. Models of Type 58 Recorder come with either 6-, 9-, or 12-in. charts, are either spring wound or electric driven, and have from 1 to 4 recording pens. A. W. Cash Co.

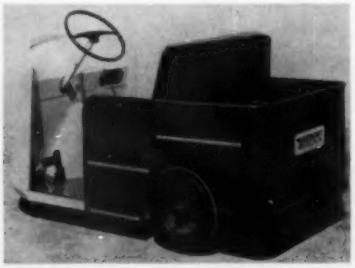
50—PIPE FITTINGS for angular branch connections

Elbolets are announced as branch welding pipe fittings for constructing angular

branch connections with a full penetration weld. They are used for making 45-deg connections for directional flow and instrument connections, and for connections into elbows for instruments, drips, and hangar and support connections. Bonney Forge & Tool Works.

51—ELECTRIC CAR costs little to buy, operate

Besides low initial cost, the Dispatcher is reported to operate at a fraction of a cent a mile. Suggested for interplant service,



this electric car is 30 in. wide, 74 in. long and has a ¼-ton cargo capacity. It has an automotive type steering wheel, is powered by four heavy-duty automotive batteries, has three speeds forward and three reverse. The Dispatcher has two-wheel brakes. West Coast Machinery, Inc.

52—RUBBER PAINT adheres to many surfaces

APCO Liquid Rubber Paint is reported to have excellent adhesion to metal, wood, plastic and concrete. It dries to form a continuous film which moisture and rain do not penetrate, and which is not affected by acid, alkali or fungus, according to manufacturer. This paint may be

For more facts circle 625 on Reply Card——→

WHAT?
AB-I's cost less than safety switches?
YES!
In many cases Westinghouse AB-I circuit breakers do. And check the other concrete benefits that safety switches can't match.
You realize definite reductions in wiring costs: because the enclosure is installed first and unit breaker wired later, there is no obstruction to pulling wires. At the present-day electrician's rate of pay, this adds up to real dollar savings.
In order not to tie up your capital until breakers are actually needed on a job, you may purchase the enclosure only. Westinghouse unit breakers are sold separately for your convenience.
Don't these reasons prove to you that Westinghouse AB-I breakers are today's best circuit protection buy?
J-30222
WATCH WESTINGHOUSE!
WHERE BIG THINGS ARE HAPPENING FOR YOU!

85% More Storage Space with CHICAGO TRAMRAIL TRAK-RAK STORAGE SYSTEMS

TRAK-RAK Interlocking Transfer System which permits two hoisting columns to serve four bays.

The Chicago Screw Co. increased pallet storage over 85% in the same storage space in each of four bays with TRAK-RAK Crane System, storing 2100 pallets in the same space formerly required for 1120 pallets.

The Chicago Screw Co. also saved many man hours due to the simplicity and maneuverability of the TRAK-RAK System which allows accurate placing of materials in and out of the storage area.

The original installation served an approximate area of 9,000 sq. ft., with an interlocking transfer system which allows the movement of the hoisting columns from one bay to another. Due to the extreme flexibility of TRAK-RAK Systems, additions can be readily made in most installations. Since the original installation, The Chicago Screw Co. has added a fourth bay which interlocks with the three previous bays.

This system is an under running transfer system; however, TRAK-RAK Systems can also be furnished as top running or self-contained systems operating on rails mounted directly on top of the racks.

ASK FOR COMPLETE INFORMATION . . . descriptive catalog, pictorial record of various applications and engineering data.

CHICAGO TRAMRAIL CORPORATION

1324 So. Kostner Ave. Chicago 23, Illinois

For more facts circle 626 on Reply Card

NEW PRODUCTS

(Begins on page 154)

applied by brush or spray, is self-vulcanizing and needs no mixing. It dries within 30 min and when properly applied is said to last 5 to 10 yr, remaining flexible and not peeling or flaking. Claimed resistant to oil, gasoline or naphtha, the paint is suggested for anything from oil-treated shingles to steel boat hulls. Adhesive Products Corp.

53—BELT CONVEYORS expand as much as 17 ft

This line of heavy-duty, portable belt conveyors, designed to expand as much as 17 ft, is announced as particularly applicable for loading and unloading of trucks and railroad cars, expanding into

the vehicles from loading docks. Despite their size, they can be easily moved and set as part of a conveyor system. Larger of the two conveyors has a distributed load capacity of 4,000 lb with a minimum length of 26 ft expandable to 43 ft. The 16 in. wide belt moves at a speed of 78 fpm powered by a 2-hp, 220/60/3 motor. Total weight is 5,200 lb. The small unit, which has a total distributed weight capacity of 1,000 lb, is 15 ft in length expandable to 25 ft. Its belt moves at 75 fpm, is powered by a 1-hp, 110/60/1 motor, and weighs 1,515 lb. Both units have 6 casters which are 2-in. wide and 6-in. diameter. Stability is provided by two floor locks. The Colson Corp.

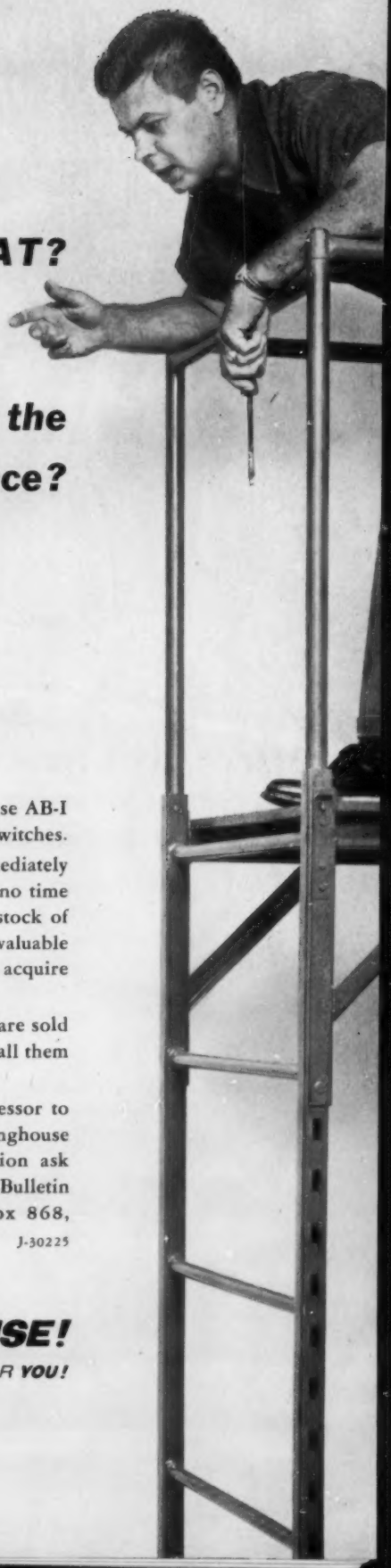
Use the Reader Service Cards provided on pages 229-230 to ask for more information on these products. Circle item numbers of products in which you are interested.

54—BLOWER handles the toxic and hazardous gases

Development of a leak-proof centrifugal blower for handling corrosive, toxic and radioactive gases at high temperatures and system pressure is announced. The blower is designed to handle 20 cfm of gas having a specific gravity of 6, develop a 150-ft head in a 2000-psi system, and operate at gas temperatures up to 500 F. The unit consists of a centrifugal blower and canned motor sealed in a stainless steel enclosure. Motor rotor and bearing components are in the lower portion, which is filled with water. Fluid piston radial and thrust bearings make the leak-proof design possible, manufacturer states.

An auxiliary pump impeller on the

For more facts circle 627 on Reply Card →



WHAT?

AB-I's eliminate the replacement nuisance?

FOREVER. And in many cases Westinghouse AB-I circuit breakers actually cost less than safety switches.

A flip of the handle restores power immediately after faults. With nothing to replace there is no time delay, no maintenance expense. There is no stock of replaceable devices to maintain—tying up valuable floor space. No need for capital investment to acquire such a stock.

Westinghouse unit breakers and enclosures are sold separately, for your convenience. Buy and install them as desired.

AB-I circuit breakers are the modern successor to the fused switch. Can you afford *not* to use Westinghouse AB-I circuit breakers? For further information ask your Westinghouse distributor for Descriptive Bulletin 30-250 or write Westinghouse, P. O. Box 868, Pittsburgh 30, Pa. J-30225

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU**!*

KENNEDY presents the *NEW* Look in Bronze Gate Valves

Fig. 427
Standard 125-lb. S.W.P. Bronze Gate, Non-Rising Stem, Inside Screw, Wedge Disc, Screwed Ends.

Fig. 427BS
Standard 125-lb. S.W.P. Bronze Gate, Non-Rising Stem, Inside Screw, Wedge Disc, Brazing Socket Ends.

Fig. 427SJ
Standard 125-lb. S.W.P. Bronze Gate, Non-Rising Stem, Inside Screw, Wedge Disc, Solder Joint Ends.

KENNEDY'S *NEW* Cylindrical Design Means Greater Body Strength, Far Longer Leakproof Valve Life!

RUGGED BODY DESIGN . . . assures superior resistance to distortion as proven in high pressure steel valve design; Kennedy's grueling Accelerated-Wear tests conclusively prove this construction guarantees more than 10 times longer leakproof operating life than oval-body valves. Increased weight assures greater durability and longer valve life.

KENALLOY STEM . . . a special Kennedy stem material of silicon bronze with high tensile strength, accurately machined for ease of operation. The bronze alloy prevents seizing or galling and is entirely free from any tendency to dezincify.

PISTOL-GRIP HANDWHEEL . . . non-heating malleable iron, provides firm, easy three-way grip on top, sides and bottom. Indented rim notches top, side and bottom eliminate slip even with greasy gloves.

• *Write today for complete details. Ask for Circular*

THE KENNEDY VALVE MFG. CO. • ELMIRA, N. Y.
VALVES • PIPE FITTINGS • FIRE HYDRANTS

OFFICE AND WAREHOUSES IN NEW YORK CHICAGO SAN FRANCISCO ATLANTA SALES REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 628 on Reply Card

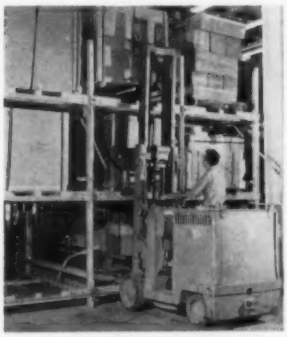
NEW PRODUCTS

(Begins on page 154)

main impeller shaft of the blower pressurizes bearings. Contact between shaft and bearing occurs only during start-up or shut-down of blower. It is explained that radioactive contamination and corrosiveness of the water in the rotor and bearing cavity is limited by labyrinth seals at the water-gas interface. Water level is maintained by adding pure water at the bottom of the unit and tapping it below the seal. Water is circulated through built-in cooling coils which remove heat from motor to maintain temperatures less than 210 F in rotor and bearing cavity. Blower is arranged so that rotating and bearing parts can be removed after taking out a threaded cover plug and its seal weld. To inspect stator and cooling coils, a seal weld and main flange bolts are removed. Allis-Chalmers Mfg. Co.

55—LIVE RACKS for storing heavy loads

Made of heavy conveyor rollers, these heavy duty racks give first-in first-out control and efficient short-term storage



for extra large or heavy loads, it is announced. They are designed to accommodate palletized loads, large packages, metal parts, and other heavy loads. The rack illustrated stores palletized lots of firebrick. The Alvey-Ferguson Co.

56—LUBRICANTS resists both acids and alkalies

For problem applications, these acid- and alkali-resistant greases are claimed to provide effective protection against more than 100 corrosive agents and solvents. In addition, these specialized lubricants are reported to prevent leakage, preserve packings, protect equipment and floors and lower operating and maintenance costs. Known as the 5P Line, it includes three types (5P7, 5P8 and 5P9) covering operating temperatures from 0 to 350 F. They have a smooth, non-fibrous body, are pale amber to light cream in color and made in four consistencies (heavy, medium, light and X-light) and have an ASTM penetration range of 200 to 350.

According to manufacturer, these

For more facts circle 629 on Reply Card ⟶

WHAT?

AB-I's put machines back to work immediately?

LIKE LIGHTNING. And in many cases Westinghouse AB-I circuit breakers cost less than safety switches.

With no fuses to replace, no waiting for authorized personnel to correct the fault, anyone can restore service. A flip of the handle does it. If the fault lingers, the exclusive De-ion® arc quencher goes into action again.

Can you afford the lost production, the lost profit caused by down time, even temporary down time caused by harmless overloads? When fuses blow, temporary faults take just as long to correct as serious ones.

AB-I circuit breakers are the modern successor to the fused switch. No other protective device can match Westinghouse AB-I's for performance, quality and economy. For further information ask your Westinghouse distributor for Descriptive Bulletin 30-250 or write Westinghouse, P. O. Box 868, Pittsburgh 30, Pa. J-30226

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU**!*

penco—There's Economy in The **RIGHT** Equipment

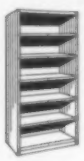
His briefcase "carries" a

FAMOUS FACTORY

When a Penco dealer calls on you, he knows that he can supply you with *more* than the equipment you need in steel shelving, cabinets and lockers.

Prompt delivery, for instance, because Penco—a division of Alan Wood Steel Company—has an assured supply of quality steel. The Penco dealer represents a firm which has pioneered in sheet metal products since 1879 . . . knows the problems of space and economy facing its customers . . . and has developed units of sturdy construction and *standard* component parts which give you low-cost equipment "custom-tailored" to your needs by the experienced Penco Planning Service, available without charge.

Write for Catalog PE

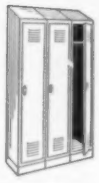


penco
Steel Shelving

puts efficiency at your workers' fingertips. Its variety of standard sizes and interchangeable units makes possible a flexibility of arrangement that will exactly meet your needs.

penco
Steel Cabinets

the Quality line—offers a complete range of sizes . . . all with adjustable shelves . . . in storage, wardrobe, combination, counter-high, desk-high, and tool cabinets.



penco
Steel Lockers

the Perma-Built Line—enable your dealer to offer you more than 60 types and sizes. You'll find a design that fits your space needs and gives satisfaction to your workers.

Planning for Your Service—Swift Service for Your Plans

Penco specialists in storage equipment engineering are available—at no cost to you—to assist in planning an efficient, practical shelving installation to meet your needs.

As a division of Alan Wood Steel Co., steelmasters for 130 years—Penco is assured the full supply of high-quality steel which enables it to make prompt delivery on all orders.

DEALERSHIPS OPEN—Write for Details

penco
STEEL LOCKERS
CABINETS · SHELVING

penco METAL PRODUCTS DIVISION
ALAN WOOD STEEL COMPANY
Oregon Ave. & Swanson St. • Philadelphia 48, Penna.

For more facts circle 630 on Reply Card

NEW PRODUCTS

(Begins on page 154)

greases provide superior lubrication to plain and anti-friction bearings, driving chains, pump packing glands, and lubricated valves in equipment such as can-closing machines, extractors, pumps, vulcanizers, conveyors, intake water screens, degreasing machines and others. Keystone Lubricating Co.

57—STICK-ON LABELS resist effect of heat, oils

This pressure-sensitive oil-resistant label is claimed to grip with increasing tightness under heat exposure. Designed for rugged application under adverse conditions, the label has a smooth surface and is said to resist attack from heat, oil, grease, dirt and many chemicals and acids. Avery Adhesive Label Corp.

58—PLASTIC MATERIAL for vacuum line sealing

This plastic gasket material is designed to solve vacuum line sealing problems by forming a protective coating around surfaces. Users report that by adding 1/64 in. film or coating to flange faces and gasket surfaces, vacuum line leakage is

reduced to a minimum. It is noted that any slight leakage which may occur after line has been in service for some time can be corrected without dismantling flanges by simply applying 1/32 in. of plastic gasket material around the outside surfaces of the flange where they meet with the gasket. The material is available in two formulations—one for air, steam, water, mild chemicals, the other for gasoline, oil, solvents. Where flange faces are unmarred and come together evenly, material can be used alone without any other type gasketing material. Plastic gasket is described as non-hardening, and flanges as easy to dismantle even after years of service. Flexrock Co.

59—PROTECTIVE COATING resists corrosion, abrasion

In its formulation, Poxycote capitalizes on the potential resistances inherent in epoxy resins, says manufacturer. Easily applied to any metal, wood or masonry surface, the coating is designed to protect against the corrosive effects of fumes, moisture and drippage of almost all chem-

For more facts circle 631 on Reply Card ——→

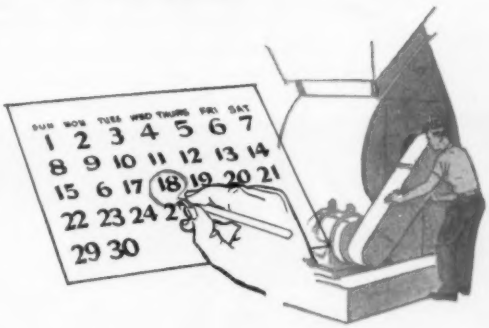
Bayley

FAN-A-GRAFICS

For Equipment Engineers

Put MAINTENANCE On a Calendar Basis!

Good fans require a minimum of maintenance service. But an ounce of prevention is worth a pound of cure, so periodic inspections are recommended. The desirable frequency of inspection will be determined by severity of service, pressure, speed, materials handled, ambient conditions, and similar considerations.



Here are some points particularly important to check regularly:

OUTSIDE The Fan:
CHECK FOR . . .

BEARINGS:

- Keep Lubricating Instructions available and follow them
- *Overheating* is a danger signal
- *Tightness* of bolts, collars, seals, etc.
- *Alignment* should be maintained

FOUNDATION AND ISOLATION MEDIUM:

- *Tightness* — check fastening
- *Soundness* — watch for failure of cement, cork, rubber, etc.

HOUSING:

- Firm and tight seams and fastenings
- Corrosion — keep paint fresh, treat cause of deterioration

SHAFT:

- Running true — should not whip or wobble
- Galling in bearings means unsafe condition

INSIDE The Fan:
CHECK FOR . . .

WHEELS:

- Blades tight, especially bolted or riveted type
- Excessive dirt accumulation may unbalance wheel, overload shaft
- Excessive abrasion may cause failure
- Running true — no striking or wobbling
- Set screws tight—vibration may have loosened them

HOUSING:

- Abrasion — near outlet, particularly — may result in perforation
- Sediment and moisture accumulation may produce corrosion
- Corrosion from contaminants may require air or fan treatment

Faithful attention to these precautions will pay dividends in more efficient, trouble-free Fan service.

BAYLEY BLOWER COMPANY

Engineered
AIR HANDLING EQUIPMENT

1825 SOUTH 66TH STREET
MILWAUKEE, WISCONSIN

NEW PRODUCTS

(Begins on page 154)

icals, and to withstand impact and abrasion and retain excellent adhesion even during extreme temperature changes. Poxycote, which can be applied as simply as an oil base paint, will prevent deterioration of equipment and facilities, company says, and greatly reduce maintenance costs. From 300 to 1000 sq ft can be covered per gallon, depending on surface to be coated, at a cost of 2 to 5 cents per sq ft. Coating is available in standard colors and finishes. Low cost testing kits can be furnished. National Coating Products, Inc.

60—HANDLING BOXES are lighter, lower in cost

NesTier Handling Boxes are now offered in a general purpose line. The new units are priced a third less than those in company's older heavy duty line, yet they incorporate the same design features. Of one-piece steel construction, these boxes come in five sizes from 12 to 36 in. long and are designed to support stacked loads from 300 to 1200 lb. They differ from the heavy duty containers only in being made of a lighter-gage metal and having no bottom runners. The nesting-stacking feature and double hopper design of the boxes permit handling parts throughout the plant in the same container. Because of their lighter weight and placement of

their movable handles, the boxes can be lifted and carried easily and safely by hand, it is pointed out, even by women. And the handles adapt the boxes for use with overhead conveyors. Chas. Wm. Doepke Mfg. Co., Inc.

61—FLOW EQUALIZER for multiple unit water heaters

To solve the problem of unequal flows of hot water from multiple-unit installations of automatic storage gas water heaters, the Equaflow—a pre-engineered manifold

assembly—is offered for use with this company's Sanimaster Gas Water Heaters. The Equaflow is designed to simplify the balanced manifolding of two, three or four identical units—and thus eliminate possibility of one or more units not supplying their proportionate share of hot water. Standard package consists of three individual manifolds—cold, mixed and 180 F. This makes them suitable for two-temperature requirements where mixed temperature tap water and sanitizing high temperatures are needed at the same time, as in dishwashers and laundry machines. Manifolds are furnished as a "knock-down" package with copper fittings and ready for on-the-job assembly. Ruud Mfg. Co.

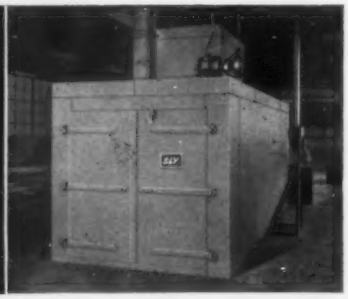
62—PACKAGED CONTROLLER for electrical braking

DynAC is a packaged control and braking system for application to standard a-c motors. Through electrical braking, braking torque diminishes as motor decelerates until a smooth, definite stop results, normally in the same time required for acceleration of the driven equipment, with no possibility of reversing, company adds. Compact and self-contained in NEMA 1 or 12 enclosures, DynAC Controllers can be installed without mechanical alterations to motor. Motor maintenance needs are limited to that normal for standard a-c motors.

To accomplish braking, direct current from a selenium rectifier is applied to one

SLY

Oven Speeds Aluminum Aging



Midwest Aluminum Company, Kalamazoo, Mich., uses a Sly box-type Oven to age 1½ tons of extruded aluminum sections per batch. The Sly Oven is, in the words of the company, an excellent installation. Frequent air changes per minute — so important in aluminum aging — are assured by the correct capacity fan. A uniform 400° F. temperature throughout is maintained by the convection-type heating system, which uses an electric air heater with a total capacity of 120 kilowatts an hour. Heavy insulated panels provide an effective heat seal.

This is another example of the wide variety of work involving baking, drying and finishing to which Sly Ovens are put. *Write for your copy of Bulletin 200,* which describes the complete line of Sly Convectioneered Ovens.

While one carload of aluminum is being heated another car is loaded. The aged aluminum is run out the exit door and the next car moved in to make a continuous operation.

SINCE 1874 SLY

THE W. W. SLY MANUFACTURING CO.

4600 TRAIN AVENUE • CLEVELAND 1, OHIO

OFFICES IN PRINCIPAL CITIES

For more facts circle 632 on Reply Card

A Private FIRE Protection System...

that reduces insurance rates

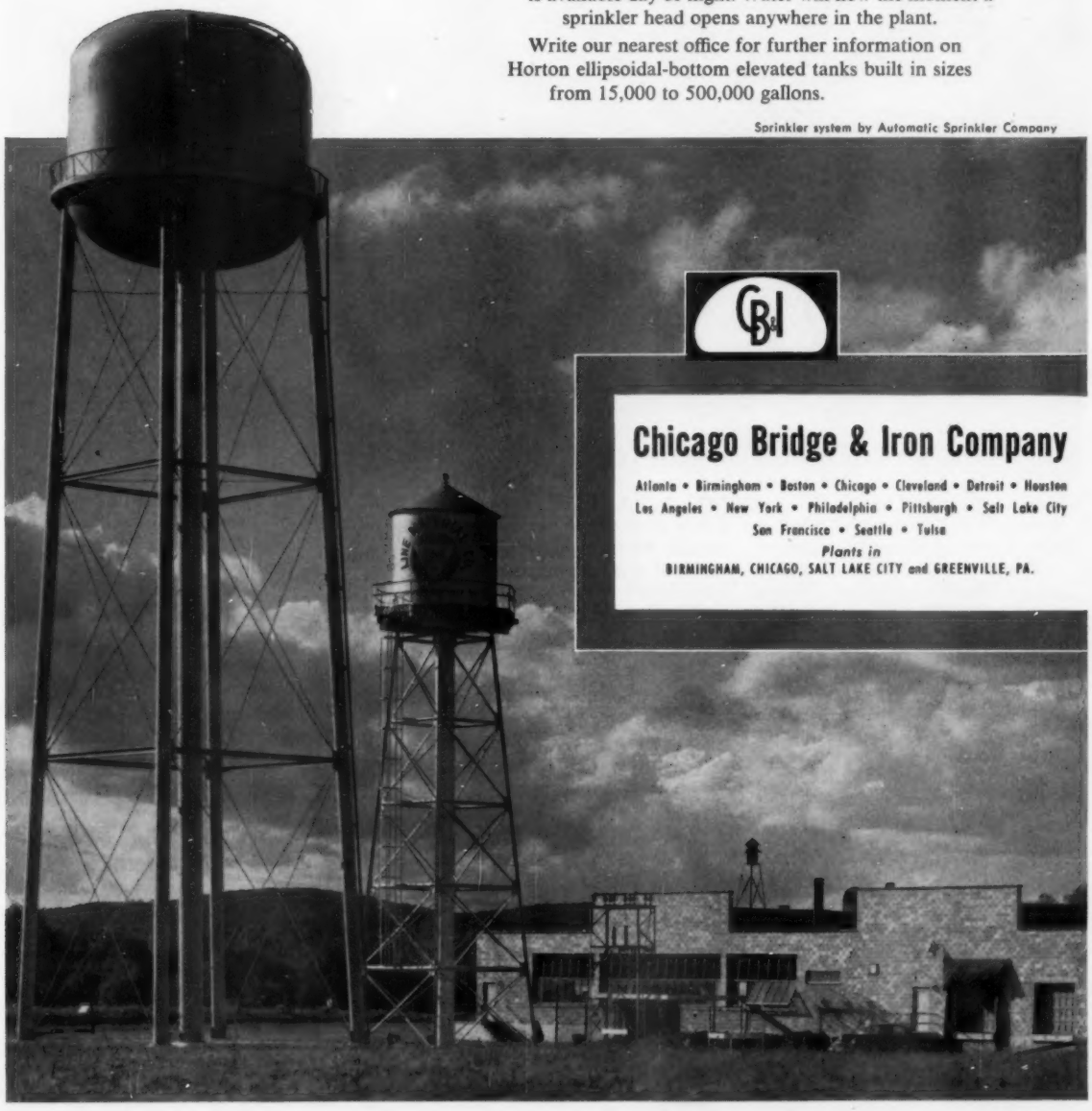
$5,000 yearly!

As a result of greater fire protection provided by a Horton® elevated tank and an 842 head sprinkler system, savings of $5,000 yearly from lower insurance rates are being realized by Line Material Company at its Olean, N. Y. plant.

The Horton elevated tank, shown in the foreground, provides a dependable gravity pressure water storage that is available day or night. Water will flow the moment a sprinkler head opens anywhere in the plant.

Write our nearest office for further information on Horton ellipsoidal-bottom elevated tanks built in sizes from 15,000 to 500,000 gallons.

Sprinkler system by Automatic Sprinkler Company



CBI

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
Los Angeles • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • Tulsa

Plants in
BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

Cleveland Trinidad votes for new

Pangborn WET DUST Collector

and now makes a clean sweep of over $50 a day!

Dust control at the Cleveland Trinidad Paving Co., Cleveland, Ohio, is necessary for efficient operation, good employee and community relations and the salvage of valuable material.

To achieve these ends, the company uses a combination of preliminary centrifugal collectors and secondary centrifugal wet collector, resulting in a salvage of materials valued at $50 per day. Cleveland Trinidad says, "This Pangborn Collector has been a very profitable investment. We investigated all types of wet dust collectors and picked Pangborn's as the best of the lot. We've had no trouble at all with this machine and will be delighted to recommend it to anyone."

Pangborn CONTROLS DUST

How do you Vote?

If you're interested in efficient, profitable plant operation, cast this "ballot" for additional information on Pangborn Dust Control. Send to Pangborn Corp., 3200 Pangborn Blvd., Hagerstown, Md.

CAST YOUR BALLOT

☐ Please send me more information on Pangborn Dust Control immediately.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

For more facts circle 634 on Reply Card

NEW PRODUCTS

(Begins on page 156)

phase of any squirrel-cage or wound rotor motor. A timing circuit allows direct current to flow only long enough to stop the motor. When activated from any desired pilot control, braking begins immediately after stop signal is received; reduced capacity taps on a transformer permit selection of degree of braking desired. Controls are available with a braking unit only, or as complete braking and starting unit for nonreversing or reversing use. Westinghouse Electric Corp.

63—REFLECTIVE MARKING speeds steel cutting

For drawing layouts on metal, this reflective marking kit features a liquid called Brite-Line. When viewed through special goggles, Brite-Line layouts are said to be 100 times brighter than those of chalk or

soapstone. Layouts can be drawn in 1/10th the usual time and cutting operation is more than twice as fast with this method, according to manufacturer. Brite-Line can be applied to metal regardless of surface condition, it is noted, even over oil film, rust and scale. It is claimed to retain brightness indefinitely, not rubbing off easily or washing off with water—but being readily removable with wire brush or steel wool. A plastic bottle with wheel-type applicator contains 33,000 linear inches of the quick-drying liquid. Also in the kit are special goggles with a built-in light and a battery. Brite-Line Corp.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 229-230.

64—BAGGING SCALE can weigh 15 a minute

This automatic belt-fed bagging scale, the FPA, will weigh and bag up to fifteen 25- or 50-lb, or twelve 100-lb bags of grain and feed products a minute, according to manufacturer. Open-type in construction, the scale is described as an accurate, low-cost unit requiring minimum maintenance. It is offered to meet a trend to 50-lb bagging units, while still providing 100-lb bagging facilities from the same scale. The FPA also accom-

SELECTED COMPOUNDS
in felted asbestos walls
+ quality varnished cambric tapes
add up to
ROCKBESTOS A.V.C.
(N.E.C. TYPE AVA) QUALITY

Pictured is the application of fluffy asbestos prior to the impregnating and compressing process.

Impregnated asbestos compressed and felted to a smooth homogeneous wall ensuring long cable life.

Compounds — specially selected compounds — which are used to impregnate asbestos walls, are one of the important reasons why you can count on Rockbestos A.V.C. for dependable, long lasting service.

For this impregnation, Rockbestos engineers not only set up rigid compound specifications but conduct a continuing testing program to insure that these standards are always met. Thus, the exactly right compound is applied to the asbestos wall at the correct temperature and at the correct pressure. *The Result . . . the seamless, felted Rockbestos wall.*

In Rockbestos A.V.C. impregnated felted asbestos walls seal varnished cambric tapes away from air and moisture. The tapes are made to Rockbestos specifications and are applied under controlled methods assuring uniform dielectric strength.

Rockbestos A.V.C. gives you long life and dependable service under every type of operating condition . . . in temperatures up to 230°F.

Complete construction and test specifications of Rockbestos A.V.C. are in the new booklet "Specification RSS-88". Write today for your copy.

ROCKBESTOS PRODUCTS CORP.
NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS
LOS ANGELES • NEW ORLEANS • OAKLAND, CALIFORNIA • SEATTLE

STOCKED COAST TO COAST
Standard Rockbestos A.V.C. construction (N.E.C. types AVA, AVB, etc.) are available for immediate shipment. Call or write nearest branch office.

For more facts circle 635 on Reply Card

Cleveland Trinidad votes for new

Pangborn WET DUST Collector

and now makes a clean sweep of over $50 a day!

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Pangborn CONTROLS DUST

How do you Vote?

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CAST YOUR BALLOT

☐ Please send me more information on Pangborn Dust Control immediately.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

For more facts circle 634 on Reply Card

NEW PRODUCTS

(Begins on page 156)

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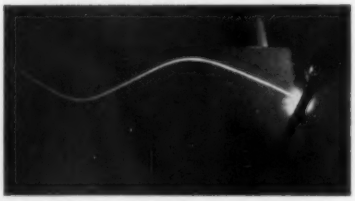
63—REFLECTIVE MARKING speeds steel cutting

For drawing layouts on metal, this reflective marking kit features a liquid called Brite-Line. When viewed through special goggles, Brite-Line layouts are said to be 100 times brighter than those of chalk or



soapstone. Layouts can be drawn in 1/10th the usual time and cutting operation is more than twice as fast with this method, according to manufacturer. Brite-Line can be applied to metal regardless of surface condition, it is noted, even over oil film, rust and scale. It is claimed to retain brightness indefinitely, not rubbing off easily or washing off with water—but being readily removable with wire brush or steel wool. A plastic bottle with wheel-type applicator contains 33,000 linear inches of the quick-drying liquid. Also in the kit are special goggles with a built-in light and a battery. Brite-Line Corp.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 229-230.

64—BAGGING SCALE can weigh 15 a minute

This automatic belt-fed bagging scale, the FPA, will weigh and bag up to fifteen 25- or 50-lb, or twelve 100-lb bags of grain and feed products a minute, according to manufacturer. Open-type in construction, the scale is described as an accurate, low-cost unit requiring minimum maintenance. It is offered to meet a trend to 50-lb bagging units, while still providing 100-lb bagging facilities from the same scale. The FPA also accom-

SELECTED COMPOUNDS
in felted asbestos walls
+ quality varnished cambric tapes
add up to
ROCKBESTOS A.V.C.
(N.E.C. TYPE AVA) QUALITY

Pictured is the application of fluffy asbestos prior to the impregnating and compressing process.

Impregnated asbestos compressed and felted to a smooth homogeneous wall ensuring long cable life.

Compounds — specially selected compounds — which are used to impregnate asbestos walls, are one of the important reasons why you can count on Rockbestos A.V.C. for dependable, long lasting service.

For this impregnation, Rockbestos engineers not only set up rigid compound specifications but conduct a continuing testing program to insure that these standards are always met. Thus, the exactly right compound is applied to the asbestos wall at the correct temperature and at the correct pressure. *The Result . . . the seamless, felted Rockbestos wall.*

In Rockbestos A.V.C. impregnated felted asbestos walls seal varnished cambric tapes away from air and moisture. The tapes are made to Rockbestos specifications and are applied under controlled methods assuring uniform dielectric strength.

Rockbestos A.V.C. gives you long life and dependable service under every type of operating condition . . . in temperatures up to 230°F.

Complete construction and test specifications of Rockbestos A.V.C. are in the new booklet "Specification RSS-88". Write today for your copy.

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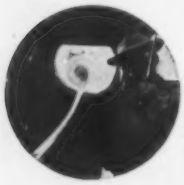
STOCKED COAST TO COAST
Standard Rockbestos A.V.C. construction (N.E.C. types AVA, AVB, etc.) are available for immediate shipment. Call or write nearest branch office.

For more facts circle 635 on Reply Card

Ask these questions, too, when you judge a fluorescent lamp...

Is your investment protected?

Check Westinghouse Fluorescent Lamps against any other brands you are now using. Check them for maintained brightness, long life, uniform appearance. If you are not entirely satisfied on all counts, your full purchase price will be refunded.



Is it built with tailored glass?

Quality of glass in a fluorescent lamp directly affects lamp performance. Westinghouse makes all of its own fluorescent lamp glass, tailoring it from silica to finished tubing specifically for fluorescent service.

Is it the correct type, size and color for the lighting job to be done?

In the Westinghouse fluorescent family of 290 different lamps—including Slimline and Rapid Start—there's a type and size precisely right for every office, plant and merchandising application. Colors include seven different shades of "white" alone.

For the full story on how to get more for your money in fluorescent light, contact your Westinghouse Lamp Representative.

WATCH WESTINGHOUSE

*WHERE **BIG** THINGS*

*ARE HAPPENING FOR **YOU!***

For more facts circle 636 on Reply Card

NEW PRODUCTS

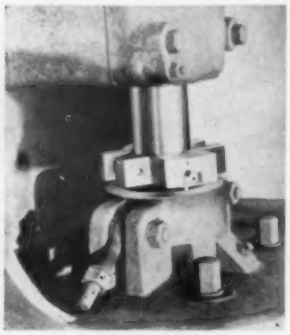
(Begins on page 154)

modates 25-lb bags, by means of a gate assist mechanism. The scale is designed to handle non-dusty materials, including grain, pellets, crumbles and range cubes up to 2½ in. Of heavy-gage steel, it has a weigh beam ratio of one to one, which permits simplicity of construction and operation, company reports, and it occupies a minimum headroom of 8 ft, 2¾ in. Richardson Scale Co.

65—REFACING TOOL prepares pump stuffingbox surface

The BJ Stuffingbox Refacing Tool is designed to prepare pump stuffingboxes for mechanical seal installation. The tool prepares a smooth gasket surface on the stuffingbox end to assure proper mechanical seal performance.

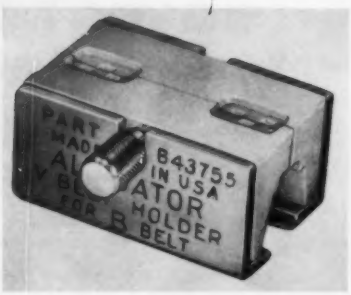
Consisting of tool bit and holder, tool



machines stuffingbox end at right angles to shaft axis. Bit holder mounts on shaft with tool bit against stuffingbox end. The bit is adjusted to bore and is worked outward by turning shaft with a Stillson or strap wrench. According to company, a mechanical seal, properly installed eliminates stuffingbox repacking and maintenance and solves problems of leakage on most pumping services. Tool is chrome plated and is shipped with wrenches and two extra tool bits. It is available in three standard sizes from ¾ to 3 in. Byron Jackson Pumps, Inc.

66—SOLVENT DETERGENT with safety features

Composition 117 is a clear solvent designed to remove grease, oil and smut from machinery where water cannot be used. It is claimed equally effective in cleaning electrical equipment. The new material has a flash point of 185 F, Cleveland open cup, manufacturer states, and has an exposure tolerance rating 2½ times greater than trichlorethylene and 20 times that of carbon tetrachloride. You use it full strength, apply it by brush or immersion, or with a non-atomizing spray. For certain applications it is declared possible to use the material diluted with up to equal parts of high flash petroleum distillate. Oakite Products, Inc.

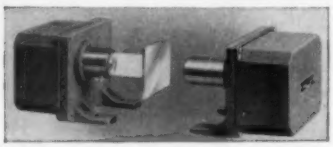


67—FASTENER TOOL makes V-belts of any size

This handy pocket size V-fastener tool lets you make up V-belts of any length much quicker than heretofore possible, it is announced. The low cost of the tool will enable many small users of V-belts to keep a few feet of open-end V-belting plus the tool on hand to make fast emergency replacements. The tool, or holder as it is called, is made for B and C Section V-belts. Bulletin V-219 gives more information on this and other items on company's Alligator V-belt fastener line. Flexible Steel Lacing Co.

68—PHOTOELECTRIC UNIT is glass operated

Development of a photoelectric control for operation by glass, cellulose and various transparent materials is announced. The new light source produces a light beam of short wave length which glass, cellophane, etc., interrupts. The photoelectric control is actuated by the special



light beam at distances up to 5 ft. Minimum phototube light time and phototube dark time is given as 0.05 sec each. The control relay energizes when light is on the phototube. Contacts are DPDT, rated 8-amp at 115 vac, non-inductive. Both light source and control have splashproof cast aluminum cases tapped for ½ in. conduit. Control is designed for 115 v, 50-60 cycles. Autotron, Inc.

69—ROTARY PUMPS of internal gear design

Five new series of internal gear rotary pumps are announced as offering great versatility in application. All employ company's circular tooth design in their rotors and idlers, a feature said to provide rolling contact and smooth engagement of teeth and to result in reduced friction and high volumetric efficiency.

Series A, standard duty pumps, come in 10 sizes, 3 to over 100 gpm capacities, maximum speeds of 650 and 1800 rpm. They handle liquids of light to medium viscosities at up to 125 psi. Similar to them, the Series B pumps are designed

how to judge a fluorescent lamp . . . point no. 9

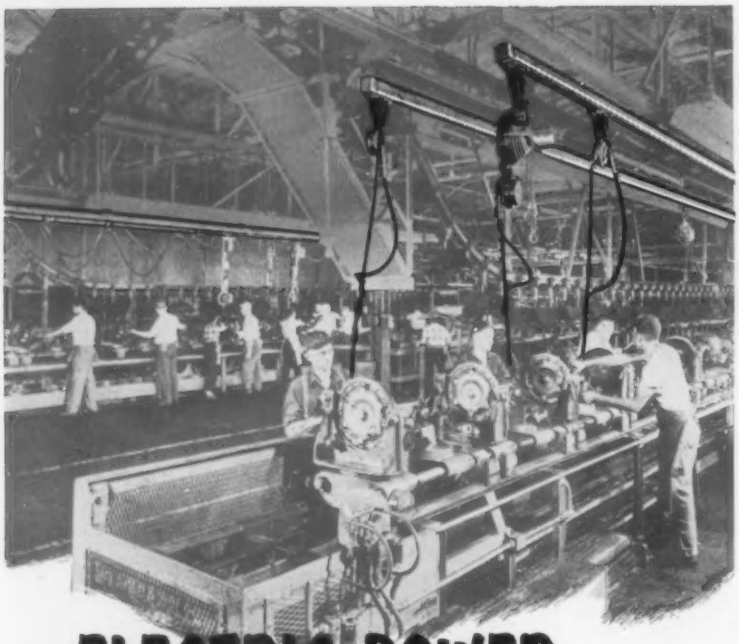
ask about **ELECTRODE QUALITY**

Better electrodes in a fluorescent lamp mean *longer lamp life*. That's why Westinghouse cuts no corners in its electrode manufacture. All Westinghouse electrode coil wire, for example, is drawn through diamond dies. Some of it has to be drawn so fine that a single pound will extend from New York to Pittsburgh. Thanks to constant development of new and better ways to make fluorescent lamp electrodes, Westinghouse has *tripled* the life of its fluorescent lamps since 1948.

WATCH WESTINGHOUSE

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

For more facts circle 637 on Reply Card



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● Get acquainted with industry's most modern, most flexible, most convenient system of electrical distribution — FEEDRAIL Trolley Busways. Here's the electrification system that's made to order for fast, low-cost assembly and production.

Installed over work areas, FEEDRAIL provides a continuous, uninterrupted source of electric power. Through its easy rolling trolley outlets, the power can be brought to the work — or move right along with it. Any tool or machine used on an assembly line can be powered by FEEDRAIL. If new tools are put into service, additional trolley outlets can be quickly and easily inserted in the track without shutting down power — and without interrupting work in process.

And, should future plans require extensive changes in your production set-up, FEEDRAIL can be quickly dismantled and reinstalled in another area to serve an entirely different operation.

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For more facts circle 638 on Reply Card

NEW PRODUCTS

(Begins on page 154)

for handling hazardous liquids such as naphtha and benzene. They have a special stuffingbox and an alternate mechanical seal.

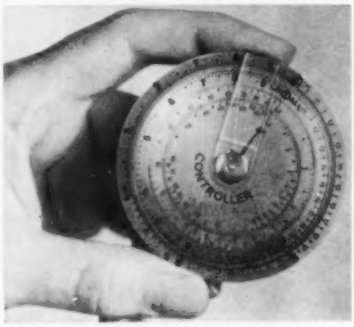
For heavy duty, the Series C group consists of 650 maximum rpm pumps with capacities in excess of 300 gpm. Series D units are for LP gases and other highly volatile substances at up to 100 gpm. Steam-jacketed modifications of the heavy duty models, the Series E units are for asphalt and other materials of medium viscosities requiring a heated circuit and pump. All five series can be supplied unmounted, or assembled with motor, gearmotor, direct drive and V-belt bases. Most units are available with or without pressure relief valves. Wayne Pump Co.

70—UNIVERSAL JOINTS for slow speed applications

Now available is a series of double universal joints for slow speed applications up to 300 rpm. Thirteen standard sizes provide a horsepower range from ½ to 207 at 100 rpm, static torque from 340 to 130,700 in.-lb. Maximum operating angle is 90 deg. The joints can be supplied solid or bored, with hub diameters from ½ to 4 in. Standard lengths run from 4 to 21¼ in. However, sizes can be furnished to fit individual job specifications. Lovejoy Flexible Coupling Co.

71—CALCULATOR solves problems automatically

The Controller is an automatic calculating device for commercial and technical calculations. No preliminary knowledge is needed, company says, you just read the results. Of aluminum construction, the



handy little device weighs only 1 oz with case, and is 3 in. in diam. According to company, it will not wear or break, and is not affected by climatic conditions. The calculator performs multiplication, division, exchange rates, currency calculations, cost of merchandise, fuel consumption, speeds, percentages, interest and compound interest, margins, counter offers, circle calculations, areas, volumes, squares, cubes, medial section, fractions to decimals and inches to centimeters and reversed. (It won't add or subtract). It sells for around $8.00. Silver Bells Ltd.

Over 300% reserve

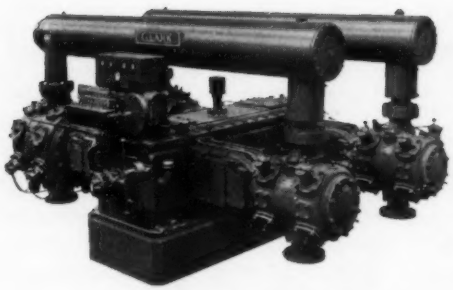
Built in the Crankshafts of many Clark Balanced/Opposed Compressor Models

Extra-heavy crankshafts are standard equipment on Clark Balanced/Opposed compressors . . . it's brought about by standardization.

All models of a particular stroke size have the same bearing and crankshaft diameter. As an example, the number one crankpin of all CMA models is capable of transmitting with complete safety 600 BHP. The CMA-2 rated at 150-300 BHP and the CMA-4 rated at 350-500 BHP therefore have a tremendous reserve. The same thing applies to the 14" and 17" stroke CRA and CBA models.

Rugged shaft construction assures maximum bearing life and minimum maintenance. It also eliminates the need for a bearing between opposing cylinder crankthrows which would double the force couple between opposing cylinders and in turn increase shaft stress and foundation requirements.

Your nearest Clark representative will be pleased to give you all the facts on the original Balanced/Opposed compressors, or write for bulletin 118.



CLARK 350 BHP BALANCED/ OPPOSED AIR COMPRESSOR

CLARK BROS. CO., OLEAN, NEW YORK
One of the Dresser Industries
Offices in Principal Cities Throughout the World

CLARK®

Balanced/Opposed Compressors

For more facts circle 639 on Reply Card

New Plant Construction

(Continued from page 140)

fabricating plant adjacent to reduction plant. Plant will have the advantage of large quantities of power, as well as transportation facilities for the shipment of aluminum east or west and low-cost water transportation of raw materials. Cost of plant with power installations reported to approximate a $100 million investment.

Cleveland, O.—Republic Steel Corp., 1405 Republic Bldg., has announced plans for the construction of a new electrolytic zinc plating line at company plant here. The line will have an initial capacity of 10,000 tons of galvanized sheets. Engineering provision to facilitate expansion up to 12,000 tons monthly are being incorporated in the addition. The new installation will cost approximately $4.5 million.

Cleveland, O.—Warner & Swasey Co., 5700 Carnegie Ave., manufacturers of turret lathes, tools and hand screw machines, has announced a major expansion program at both plants of company's operation at Cleveland and New Philadelphia, O. Expansion at both locations will cost $2.8 million.

Greenville, O.—Corning Glass Works, Corning, N. Y., has authorized plans for the construction of a new plant for the manufacture of Pyrex glass. Site of 34 acres has been selected for the new 265,000 sq ft facility and work is already under way, with completion scheduled for late 1957. Two glass melting tanks will be installed along with other equipment. Cost of plant and equipment will represent a multi-million dollar investment.

Muskogee, Okla.—Fansteel Metallurgical Corp., North Chicago, Ill., has completed plans for the construction of new plant for the production of columbium and tantalum metals. Plant will be erected on a 113-acre site on the Arkansas River, recently acquired for the purpose, to meet the ever increasing demand for both of these metals in the nuclear reactor field and will increase production of tantalum and columbium by 50 and 150 per cent, respectively. Cost of new plant and equipment will be $6.5 million.

Clairton, Pa.—United States Steel Corp., 525 William Penn Place, Pittsburgh 30, Pa., plans a multi-million dollar light oil purification plant for the production of super refined benzene, toluene and xylene by a new process. Koppers Co., Koppers building, Pittsburgh, Pa., will construct the plant and U.S. Steel will operate it under rights acquired by Koppers from a German concern which first developed the pressure catalytic refining process. Construction work will begin this fall with completion scheduled for late 1957.

Reading, Pa.—Beryllium Corp., Tuckerton Road, Reading, Pa., has announced construction plans for a new plant to produce nuclear grade beryllium metal on a site recently acquired near Hazleton, Pa. Work will begin at once and plant is scheduled to be in production by mid-1957. Plant will occupy a small part of a 2010-acre tract recently acquired for the purpose and, when completed, will become the nuclear division of the company. Cost of plant estimated at $4 million.

Longview, Texas—Garrett Oil Tools, Inc., a division of U. S. Industries, Inc., has authorized construction of a new ultra modern manufacturing plant and office. The new tool plant, office structure and experimental research and development center will be erected on a 40-acre tract of land in the Longview Industrial district of the city. Buildings will be of concrete and metal construction and will be air conditioned and insulated throughout. Estimated cost of combined facilities, to be completed in 1957, will be approximately $1 million.

Point Comfort, Texas—Aluminum Company of America, 1200 Alcoa Building, Pittsburgh, Pa., has authorized construction of a seventh potline to its primary aluminum plant here. Construction of the new facility will begin at once with production scheduled for early 1958. Company will spend $11 million on new installation.

FIND OUT HOW
GARDEN CITY FANS
Cut Maintenance Costs

HSH
(Heavy Duty)
Material Handling Wheel

NOL
(Non Overloading)
Backward Curve Wheel

• **Heavy Duty Steel Endures Longer**

Garden City uses heavy gauge steel which resists abrasion and corrosion for a longer period of time.

• **Design of Blades Steps Up Efficiency**

Each blade designed for a specific job. 77 years of experience goes into their making!

• **Replacement of Parts Rare**

Garden City Fans installed 30 years ago are still going strong.

• **Hot Air Fans Have Air-Cooled Shafts**

The famous patented air-cooled shaft saves you dollars on your bearings-upkeep.

Ask to see the list of blue chip industries using Garden City Fans
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ESTABLISHED 1879

332 S. Michigan Ave.
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Representatives in Principal Cities

• Fans for Industry • Backward Curve • Forward Curve
• Material Handling • Radial Bladed • Small Exhaust

For more facts circle 640 on Reply Card

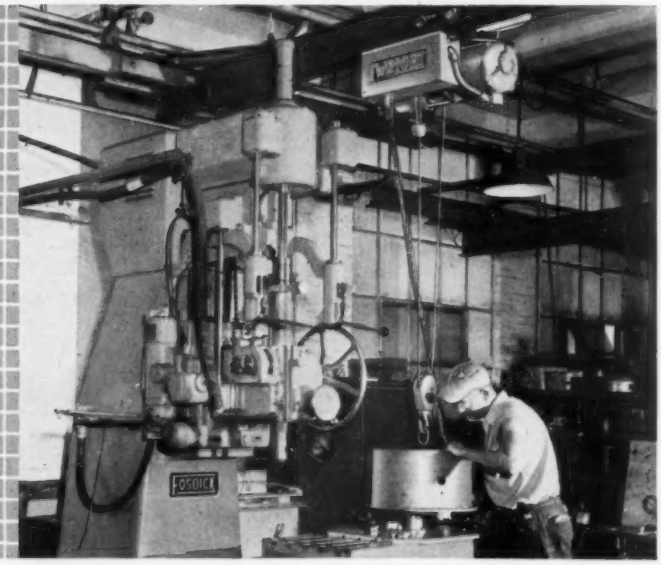
For more facts circle 641 on Reply Card

ACCO products

The WRIGHT Hoists for Dependability

NOW! a New 2-Speed WRIGHT Frame 1 Hoist permits precise, gentle positioning of production work

The picture below shows a WRIGHT Frame #1, 2-speed Electric Hoist placing heavy equipment gently on a very precise machine. This is just one of the applications for which this hoist is particularly well suited.



CAPACITIES 500 TO 2000 LBS

Compare the flexibility, versatility and dependability of these WRIGHT Hoists with other types of hoists:

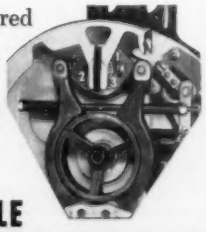
2 SPEEDS • A fast lifting and lowering speed—and a slow speed (¼ the rate of the fast speed) for precise, gentle positioning of work—accomplished by use of 1800/450 RPM motors.

FLEXIBILITY • Travel of hoists on rail or jibs is limited only by the availability of electrical service.

SERVICE AVAILABILITY • Failure of power source is quickly and easily remedied for individual electric hoists.

MAINTENANCE • Very little maintenance required and this is easily handled on WRIGHT hoists.

Brake adjustment on all WRIGHT *Speedway* Electric Hoists is foolproof. There is nothing to adjust but the cam!



ACCO

Wright Hoist Division
AMERICAN CHAIN & CABLE

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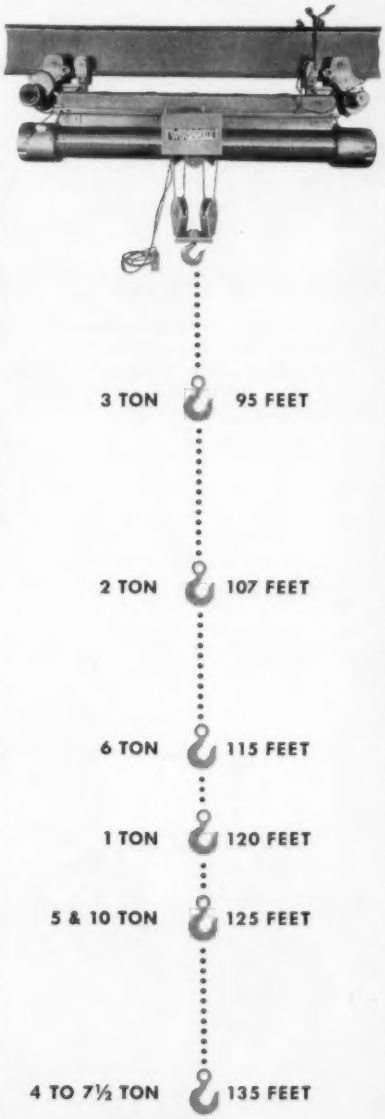
EXTRA-LONG-LIFT ELECTRIC HOISTS

Single layer of cable in machine-grooved drum



***Write** for complete information on the sensational new WRIGHT 2-Speed Hoist and the Extra-Long-Lift Hoist shown above.*

Better Value

INDUSTRIAL FILMS

Electrostatic Spray Painting

FOR THOSE interested in production line painting operations, there is now available a 16 mm color and sound film, "The Big Attraction", concerning electrostatic spray painting. Running time is 30 minutes.

Viewers are first given a brief introductory explanation of electrostatic spray painting processes and equipment, then are taken on a trip through plants where the process is being used to paint a variety of products, such as automobile chassis, lighting fixtures, refrigerators, toys, home laundry appliances, door knobs, etc.

The film is available from Ransburg Electro-Coating Corp., Barth & Sanders Streets, Indianapolis 7, Ind.

Corrosion Control With Zinc

THROUGH USE of animation and color, this 16 mm film shows how zinc functions to control corrosion of iron and steel. It explains methods for coating steel stock or products with zinc and surveys the various fields of usefulness for zinc coated parts.

The film also shows continuous galvanizing lines, the hot dip galvanizing of large structural parts and various methods of corrosion prevention with zinc such as cathodic protection, metallizing, sherardizing and painting.

Running time of "Zinc Controls Corrosion" is about 35 minutes. It is available for showings, without charge, from The American Zinc Institute, Inc., 60 East 42nd St., New York 17.

Pipe Insulation

FOAMED PLASTIC pipe covering, Armaflex, is the subject of an 11-min sound-slide film. According to the film, the insulation has been found practical in preventing condensation on copper tubing or iron pipe used in a temperature range of 32 F to 200 F. It can be applied to new or existing pipes with a minimum of fitting cover fabrication. Application is simple.

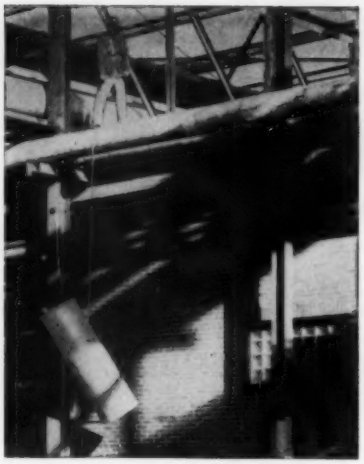
Groups interested in seeing the film should write to Armstrong Cork Co., Insulation Div., Lancaster, Pa., or to a local office of the company.

Equipment Positioning

A FULL COLOR 35 mm sound slide film on positioning equipment is available. This 18-minute, narrated film, "Position For Production", covers the ABC's of welding positioners, automatic manipulators, and turning rolls, and provides application tips.

The film may be obtained by writing direct to Worthington Corporation, Advertising & Sales Promotion Department, Harrison, N. J.

"That's funny! According to Poisson's Ratio your waist should get bigger."



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(See ad on facing page)

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AMARILLO, Ball Distributing & Engr. Co.
APPLETON, J. D. Wilson Co.
BILLINGS, Mont., L. W. Worthington
BIRMINGHAM, Ala., Shook & Fletcher Supply
Southern States Iron Roofing Co.
BROOKLINE, Mass., Homans-Kohler, Inc.
BUFFALO, Frontier Insulation & Supply Co.
CHARLESTON, W. Va., Baldwin Asbestos Products Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHICAGO, E. C. Carlson Co.
CINCINNATI, R. E. Kramig & Co.
CLEVELAND, The Miles Materials Co.
COLUMBIA, S. C., Southern States Iron Roofing Co.
COLUMBUS, Santeler Brothers
DALLAS, Insulation Supply Co., Inc.
DAVENPORT, Republic Electric Co.
DENVER, Gene Wright Lumber Co.
DETROIT, Coon-DeVisser Co.
EL PASO, Insulation & Specialties Co.
FARGO, N. D., Smith, Inc.
FT. SMITH, Ark., Gunn Distributing Co.
FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, The Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
HOUSTON, Precision Insulation Co.
INDIANAPOLIS, Central Supply Co.
IRON MOUNTAIN, Mich., Champion, Inc.
JACKSON, Miss., Machinery Sales & Service Co., Inc.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Kelley Asbestos Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products
Plant Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MADISON, Wis., J. D. Wilson Co.
MEMPHIS, John A. Denie's Sons Co.
MIAMI, Southern States Iron Roofing Co.
MILWAUKEE, J. D. Wilson Co.
NASHVILLE, Southern States Iron Roofing Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
PHILADELPHIA, John F. Scanlan, Inc.
PITTSBURGH, D. J. Kennedy Co.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
RALEIGH, N. C., Southern States Iron Roofing Co.
RICHMOND, Va., Southern States Iron Roofing Co.
ROCKFORD, Ill., Mott Brothers Co.
SALT LAKE CITY, Bullough Asbestos Supply Co.
SAN ANTONIO, The Bracken Co.
SAN DIEGO, Western Fibrous Glass Products
SAN FRANCISCO, Western Fibrous Glass Products
SAVANNAH, Ga., Southern States Iron Roofing
SCHENECTADY, N. Y., Jon Tree Sales & Supply Co.
SEATTLE, Western Fibrous Glass Products
ST. LOUIS, A. G. Brauer Supply Co.
ST. PAUL, Asbestos Products, Inc.
SYRACUSE, N. Y., Industrial Supply Co.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TALLAHASSEE, Fla., Capital Refrigeration & Supply
TULSA, Okla., Ball Distributing & Engr. Co.
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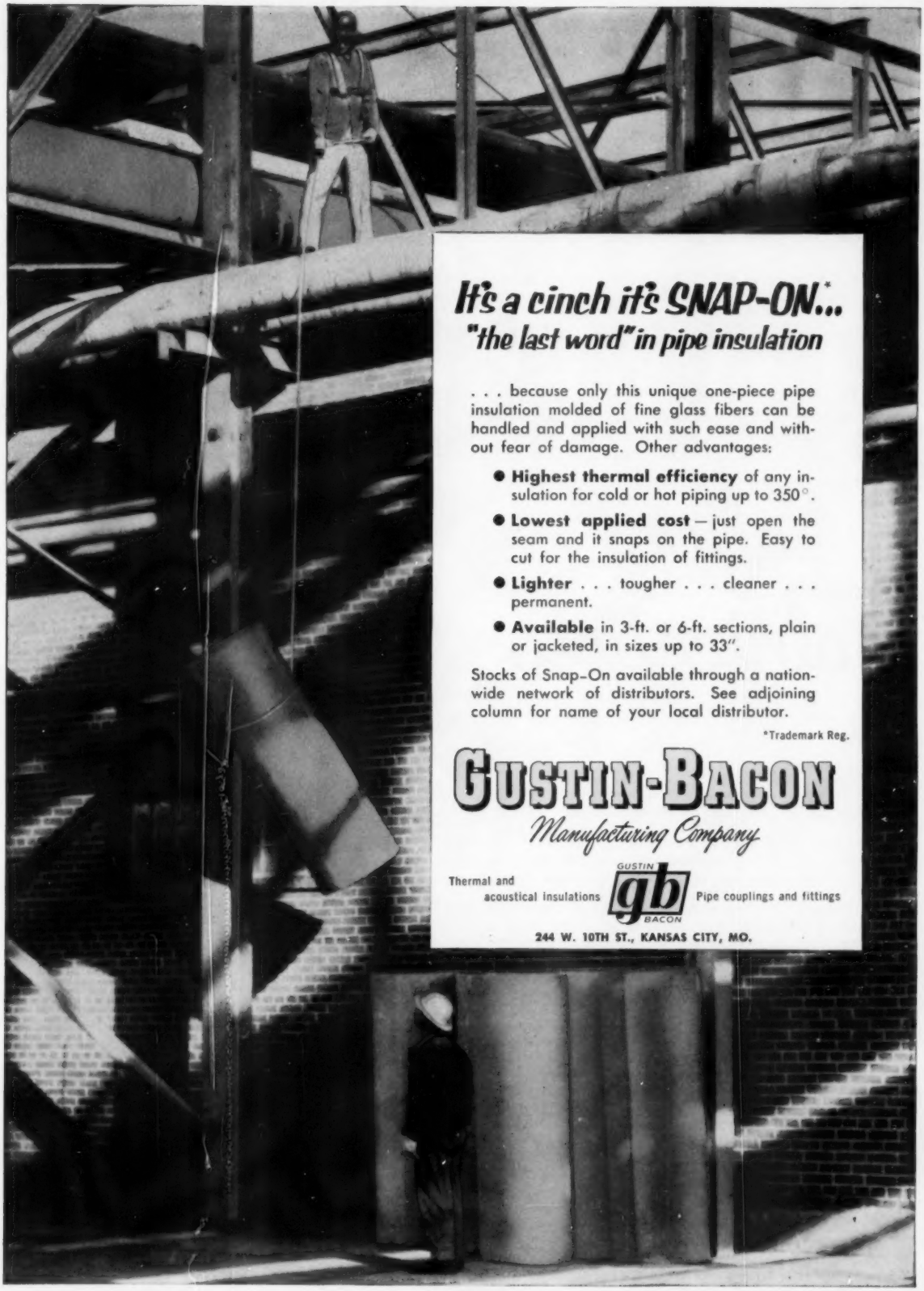

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NEW BOOKS

for the plant engineer

Law and Engineering

LEGAL PROBLEMS IN ENGINEERING by Melvin Nord, Dr. Eng. Science. Size 9-3/16 by 6-3/16 in.; 391 pp including index; colth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price $7.50.

THIS BOOK DEALS with almost every legal subject that has any bearing on engineering.

Detailed documents such as specifications are not included since they can be made available from other sources. Also, the book does not attempt to combine law and economics. However, wherever economic topics affect the law or its engineering aspects, they are fully developed.

Instead of following the usual, voluminous "casebook" approach, the book uses its cases to illustrate the discussion and to bring out the legal problems which may be encountered in given circumstances. Cases are presented in a condensed form and include a minimum of legal jargon.

In addition to legal principles, and engineering—legal problems, the book contains material on the ethical responsibilities and professional registration of engineers.

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Electronics Data

ALLIED's ELECTRONICS Data Handbook. Size 9 by 6 in.; illustrated; paper bound; 64 pp including index; stock No. 37 K 398. Published by Allied Radio Corporation, 100 North Western Avenue, Chicago 80, Illinois. Price $0.35.

THIS HANDBOOK contains a carefully selected collection of often needed formulas and data in industrial electronics and radio work.

Formulas presented in the book include those useful for basic circuit analyses, transmission line calculations, determination of vacuum tube characteristics, resonance and meter calculations.

In the way of data, there are a number of tables which cover such items as wire sizes, pilot lamp specifications, and interchangeable tubes and batteries. Direct-reading inductance, capacitance and reactance charts also appear in the publication.

Logarithmic and trigonometric tables are preceded by three pages of instructive material on the use of logarithms.

Working With People

MANAGEMENT IN ACTION by Lawrence A. Appley. Size 8½ in. by 5½ in.; 382 pp; cloth bound. Published by American Management Association, 1515 Broadway, Times Square, New York 36, N.Y. Price $5.00 (to A.M.A. members, $3.50)

THIS BOOK is a collection and selection of writings by Lawrence A. Appley, of which most appeared in various publications and periodicals of the American Management Association.

The author covers a wide range of subjects in a pleasantly informal manner, illustrating them by stories from his own experience. Spirit and character of an organization, leadership, a philosophy of management, management of men, and the techniques and tools of management, are all discussed in this publication.

Magnetic Materials

MAGNETIC MATERIALS in the Electrical Industry, by P. R. Bardell. Size 8¾ by 5⅞ in.; 288 pp including index; illustrated; cloth bound; 1955 edition. Published by Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. Price $10.00.

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69 CLEAVER-BROOKS BOILERS

Special note to dairymen:
See Cleaver-Brooks boiler exhibit
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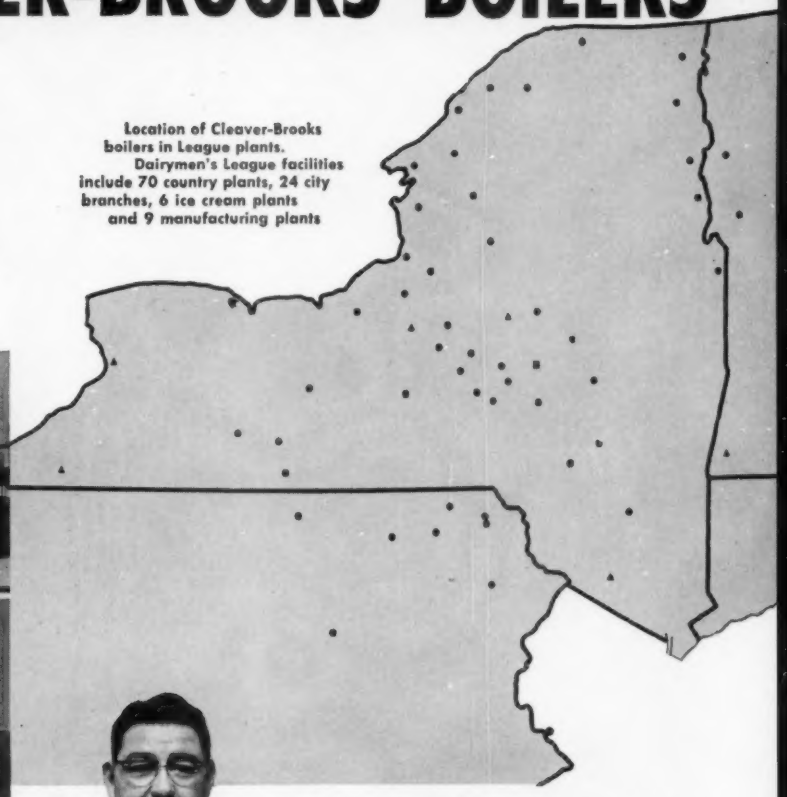
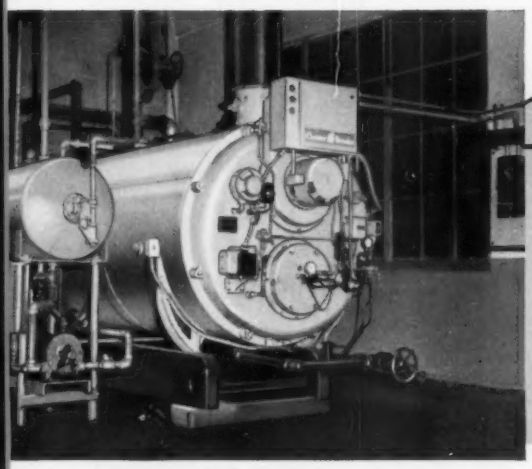


Location of Cleaver-Brooks boilers in League plants. Dairymen's League facilities include 70 country plants, 24 city branches, 6 ice cream plants and 9 manufacturing plants



MILTON, PA. — This country plant is supplied with quick, dry steam from a Cleaver-Brooks 60 hp light-oil fired CB boiler.

"Our 69 Cleaver-Brooks boilers are a key part of our production — their unusually high efficiency, sanitary, clean operation have helped us grow and prosper", says Ken Dodge, staff engineer for Dairymen's League Cooperative Association.

"Maintenance is low. We average far less than one service call per boiler per year," he adds.

Dairymen's League Cooperative Association, serving 25,000 dairy farmers and thousands of consumers in New York, Pennsylvania and New Jersey, has been a steady user of Cleaver-Brooks boilers for 20 years.

Like any dairy company, the League finds steam essential for the production of quality dairy products. Their boilers are the work horses of their plants — supplying steam for pasteurizing, heating, cleaning and processing.

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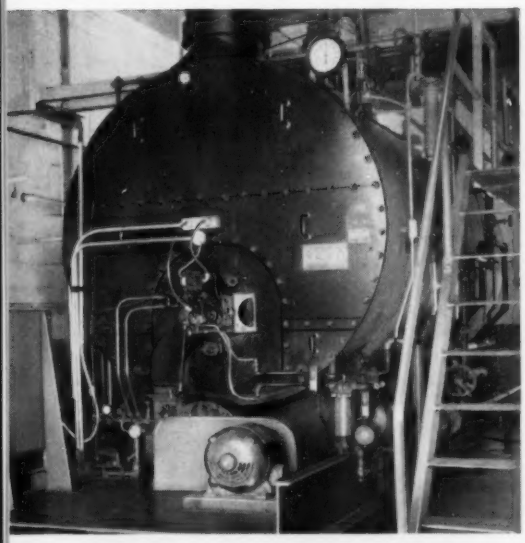

UTICA, N.Y. — In this city plant a 250 hp LR heavy-oil fired boiler provides all steam for pasteurizing, cleaning, heating and processing.

Cleaver Brooks

ORIGINATORS OF THE SELF-CONTAINED BOILER

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chanics of magnetism, with which it deals, have been moderately well understood in the last fifty years, even though knowledge of magnetic materials reaches far into the past.

The book goes into a discussion of theoretical considerations on magnetism after a helpful introductory chapter covering terminology pertaining to magnetism. This includes information on the influence of crystal structure on magnetic properties.

Under the topic of permanent magnet materials, the author has given attention to such items as design considerations, methods of magnetization, practical applications and stability. Soft magnetic materials, those with high permeability, are covered extensively in the book.

This coverage includes tables of physical and magnetic data, permeability of this type of material in sheet form, and salient features of soft magnetic materials in sheet form. The book also treats of applications of soft magnetic materials in such things as d-c machines, relays, contactors, choke coils, and in the science of telephone engineering.

Magnetic recording, testing of materials by magnetic means, magnetic amplifiers and transducers are other principal subjects on which the book offers information.

Hiring Clerical Help

RECRUITING AND SELECTING OFFICE EMPLOYEES by Milton M. Mandell. Size 9 in. by 6 in.; illustrated; 175 pages; cloth bound. Published by American Management Association. 1515 Broadway, Times Square, New York 36, N. Y. Price $4.75; members AMA $3.50.

BECAUSE THE PLANT engineer's staff of office help and clerical workers is generally at a rock-bottom minimum insofar as numbers is concerned it behooves him to make certain that each is above average in work interest ability, cooperativeness, health and all the other characteristics that make for a good employee. This book, the result of an AMA survey is one of the finest we have encountered in the field of employee or prospective employee evaluation.

To increase its usefulness to every executive faced with the problem of recruiting special groups of workers, and the selection from within or without the company of supervisors and managers, the book contains an entire section devoted to model forms. These include job descriptions, application blanks, interview rating forms, tests, reference inquiries, performance follow-up forms and merit rating forms.

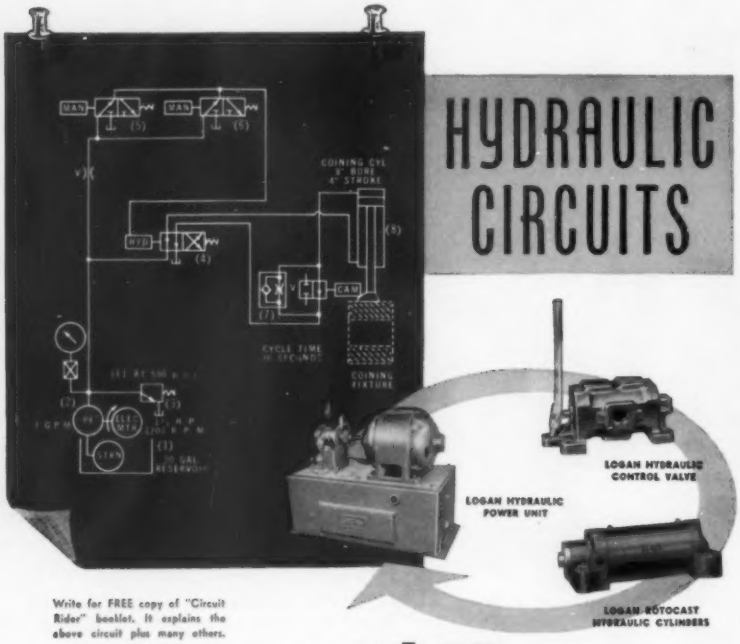
Metal Bending and Cutting

THE COLD BENDING OF METALS and Abrasive Cut-Machining of Metals. Size 9 by 6 in.; 162 pp. illustrated; paper bound, spiral edge. Published by Wallace Supplies Manufacturing Co., 1300 Diversey Parkway, Chicago 14, Illinois. Price $2.50.

TWO PRINCIPAL SUBJECTS of discussion are presented in separate sections of this process manual. Material on cold bending in this manual is separately available for two dollars and that on abrasive cut-machining for one dollar.

In the part on cold bending, information is offered on such items as bending on ram and rotary automatic machines, tools for bending, hydraulic circuit for bending operations, and designing for bending.

Under the main topic of abrasive cut-machining of metals there are two subdivisions of discussion, each in a separate portion. One deals with wheel failure, encompassing speed, bearings, power and poor fixturing. The subdivision entitled, "What Can Abrasive Cut-machining Do for You?" is relatively new. It includes tables on wheel speeds, sizes and cutting speeds; covers facets of abrasive cutting.



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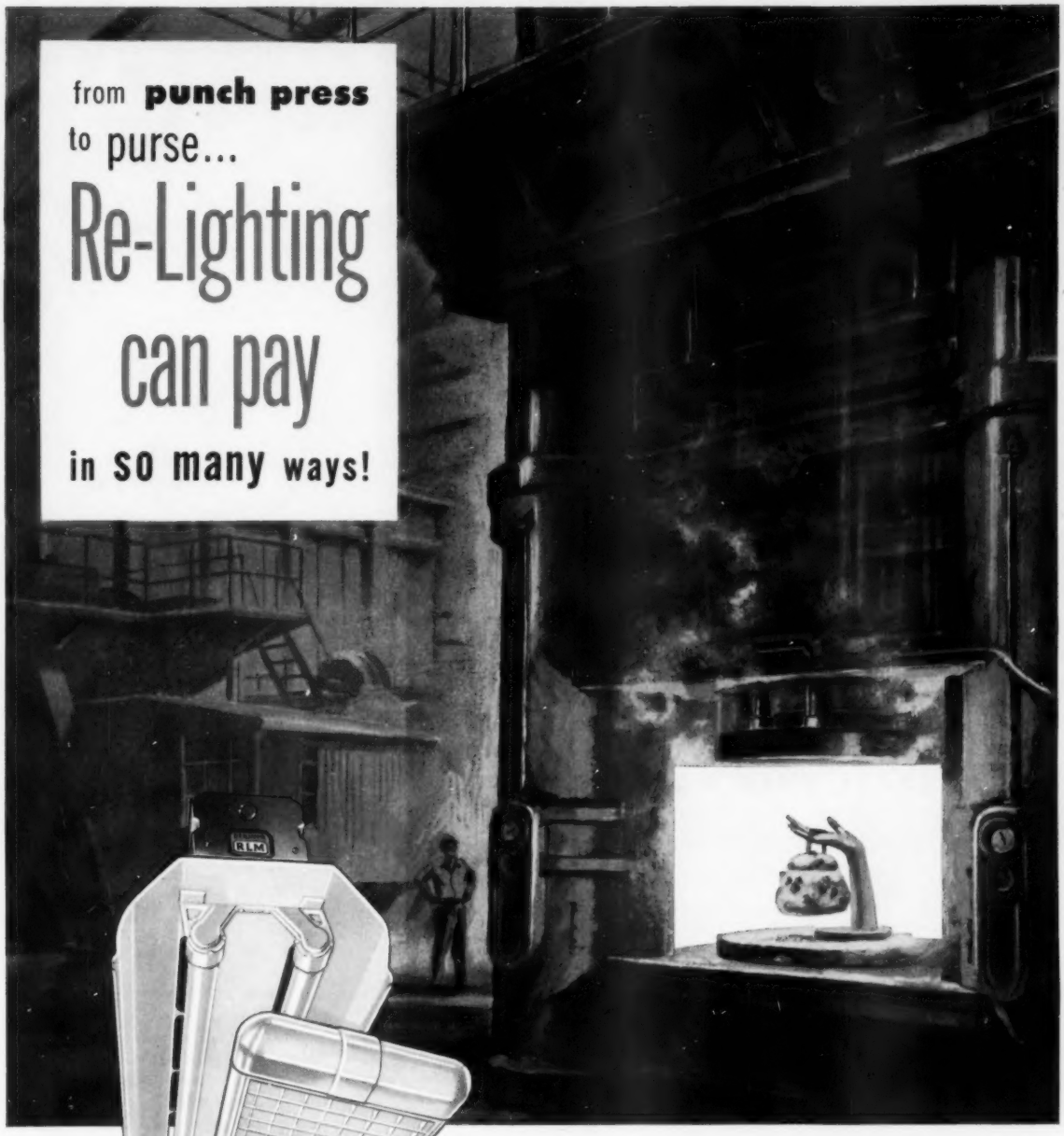

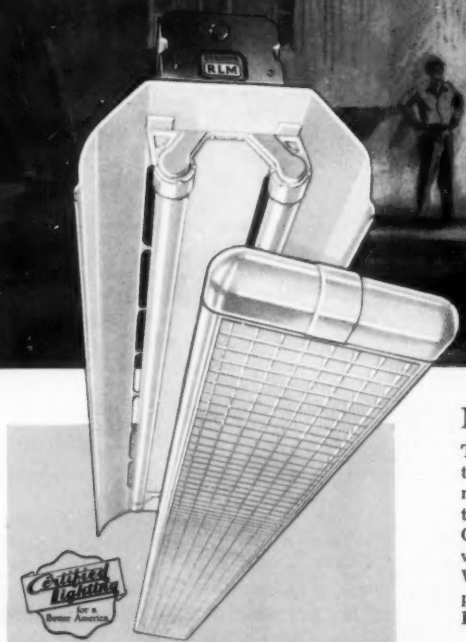

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Upper safety stop that prevents overtravel of the hook and consequent hoist damage.

Wire rope to give the strongest possible flexible line from hoist to lower block.

Non-fracturing, overcapacity hooks that warn on sight of trouble created by severe overload.

The Series "700" 'Load Lifter' Electric Hoist provides more than tops in safety. A ton can be lifted a foot in only 2 seconds. You can inspect and service the hoist *in the air*. In every way, you get quality that saves money. But more — all types of suspension are available, including an efficient motorized trolley. You have a choice of single or two-speed control. Capacities: up to 15 tons. *Get full details from your "Shaw-Box" Distributor or write us for Bulletin 410.*

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Chain Drive Performance

(Continued from page 109)

In order to obtain a better comparison, the maximum ordinate of the pitch variation graph, in inches, was scaled so that it was of approximately the same magnitude as the load variation trace on the oscillogram. The identical shape of the curves established that pitch variations in the 33¼ pitch section of chain between sprockets were causing the large load fluctuations observed.

The oscillogram shown in Fig. 3 was made on the same installation except that the composite chain was replaced with one all of one manufacture. Here, the load variation due to pitch differences has been completely eliminated and only those variations caused by sprocket eccentricity and chordal action remain.

Chain tension variations due to chordal action are easily detected on the oscillograms in Figs. 2 and 3. There are 19 of these low magnitude tension variations for each sprocket revolution, i. e., one for each tooth engagement with the chain.

The data obtained from the oscillograms are summarized in Table I.

Figure 4 shows an oscillogram obtained on a 1½-in. pitch chain run over 24-tooth sprockets at 900 rpm. All components of this drive were manufactured within ARSCM specifications. Under these conditions, the greatest load fluctuation is due to chordal action and those introduced by non-uniform pitch and sprocket eccentricity have been reduced to insignificance.

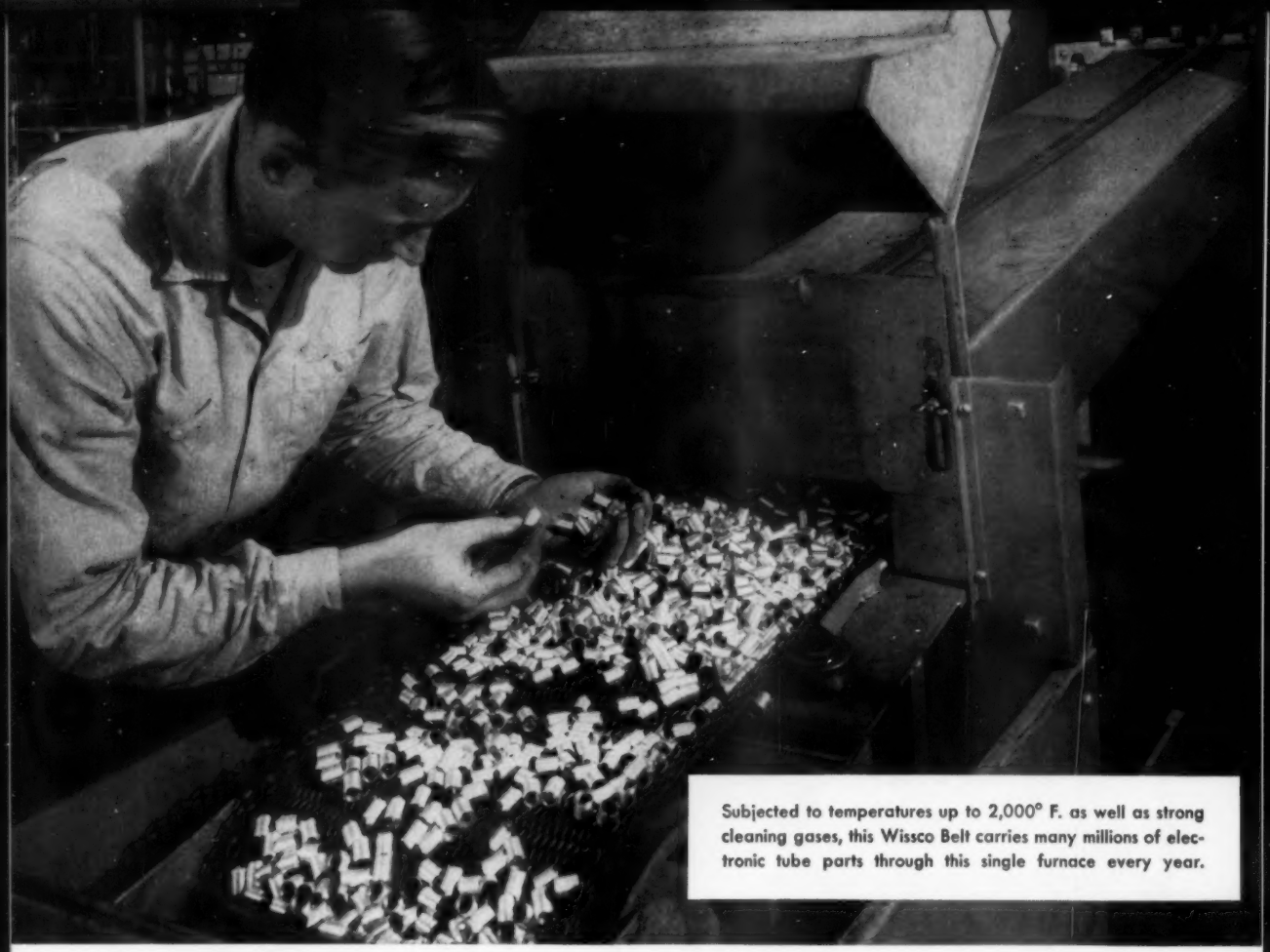
Table I points out the reduction in chain life that can be expected if new and worn chain are coupled and the necessity for extreme precision in the manufacture of chains and sprockets for power transmission. The increase in peak loads which may be developed within the power train itself demonstrates the need for careful maintenance in order to obtain the designed life from the drive.

Portable Lifts

(Continued from page 113)

During warehousing operations, portable lifts can normally right angle stack in aisles less than 5 ft wide. Otherwise unusable area can be converted to useful storage facilities because of the accessibility of such handling equipment.

Another application for portable lifts is order picking. It is possible for a stock picker to elevate himself to upper stacks or top shelves of bins to reach items, then use the carrier for horizontal transportation of the loads



Subjected to temperatures up to 2,000° F. as well as strong cleaning gases, this Wissco Belt carries many millions of electronic tube parts through this single furnace every year.

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In spite of high temperatures and strong gases, that's the record of two Wissco Belts operated by one of America's well-known electronic parts manufacturers.

What's more, these two belts enabled Tung-Sol to increase production by 100% while reducing furnace feeder crews by 50%. "In a strictly cost accounting sense, the belts paid for themselves within a matter of weeks," according to the company's production control chief, Mr. Allen Mayberry. Yet the reliability of the belts is even more important, he points out, because millions of component parts used by the company each year must pass over one of these belts. "The Wissco Belts and the two electric furnaces in which they operate are so essential to our operation that our volume production quotas are based upon their output."

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themselves, (see Fig. 1). They are especially useful in narrow bin sections where other types of trucks could not travel.

A plastics manufacturer uses powered industrial trucks for long moves of palletized trucks throughout the plant. However, because of the heavy work schedule for this equipment, portable lifts are used in and around storage areas for actual unit load stacking.

Portable lifts offer benefits to both large plants and small. Working with both powered industrial trucks and overhead handling equipment, they provide one of the most economical means of handling on a repetitive basis over a non-fixed route.

Why Do Pumps Lose Suction?

(Continued from page 125)

cessive, it might in itself account for the loss of suction described.

In order to eliminate this leakage, it would be necessary to provide the stuffing boxes of both pumps (in case they are not already so fitted) with lantern seal cages and to supply these with water under pressure. This water could be diverted from the common discharge header. Since the pumps are operated intermittently by means of a float switch, the source of the sealing water should come from a point upstream of the discharge gate and check valves.

These changes are quite inexpensive and may well eliminate the problem entirely. If they do not, it may become necessary either to install supplemental priming and air-handling equipment in the shape of a wet-vacuum pump or to replace the existing centrifugal pumps with regular contractor-type self-priming pumps. The latter have the advantage that they can generally handle a higher suction lift than conventional centrifugal pumps. They also have a definite air-handling capacity and can operate without a foot-valve, thus further reducing the friction losses in the suction piping.

Of course, the last two alterations might prove to be more expensive than

digging up the floor and lowering the level of the centrifugal pump installation into a small pit. In that event, there is still one possibility, which belongs to the second category mentioned earlier in this discussion.

This alternate solution contemplates the use of a hydraulic ejector. There are a number of these ejectors on the market which might be used to improve this installation. The ejector is installed at the lowest level to which the water supply may fall and is connected to the pump by means of two pipes. One of these is the suction pipe proper, while the second is a pipe leading from the pump discharge line to the "drive" side of the ejector.

The foot-valve is retained at the bottom of the suction pipe. When the system is once primed, part of the discharge capacity is diverted down the drive pipe into the ejector. At the

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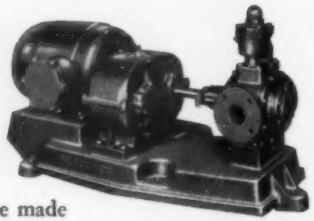

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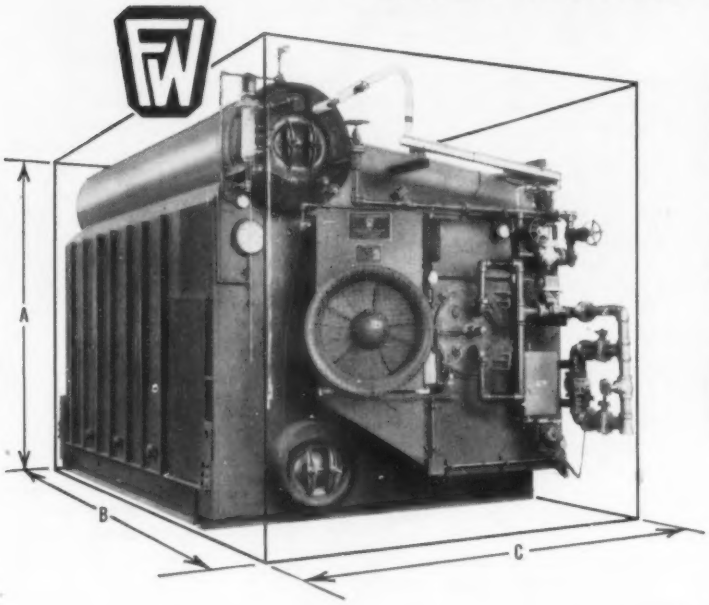

PACKAGED STEAM GENERATOR

CAPACITY RANGE AND DIMENSIONS

CAPACITY lb/hr Based on 100 psi, 212F Feedwater and Zero Blowdown		A	B*	C
#6 OIL FIRED	NAT. GAS FIRED			
13,400	12,900	12′ 1¼″	14′ 6¾″	10′ 11¼″
15,600	15,000	12′ 1¼″	15′ 7½″	10′ 11¼″
17,800	17,100	12′ 1¼″	16′ 8¼″	10′ 11¼″
20,000	19,200	12′ 1¼″	17′ 9″	10′ 11¼″
21,800	20,700	12′ 1¼″	18′ 9¾″	10′ 11¼″
24,000	22,800	12′ 1¼″	19′ 10½″	10′ 11¼″
26,200	24,900	12′ 1¼″	20′ 11¼″	10′ 11¼″
28,400	27,000	12′ 1¼″	22′ 0″	10′ 11¼″
30,600	29,100	12′ 1¼″	23′ 0¾″	10′ 11¼″
32,800	31,200	12′ 1¼″	24′ 1½″	10′ 11¼″
35,000	33,300	12′ 1¼″	25′ 2¼″	10′ 11¼″
37,200	35,400	12′ 1¼″	26′ 3″	10′ 11¼″
39,400	37,500	12′ 1¼″	27′ 3¾″	10′ 11¼″
41,600	39,600	12′ 1¼″	28′ 4½″	10′ 11¼″
43,800	41,700	12′ 1¼″	29′ 5¼″	10′ 11¼″
46,000	43,800	12′ 1¼″	30′ 6″	10′ 11¼″

**Varies with method of firing and type of combustion controls. Figures listed provide safe approximation over firing and forced draft equipment.*

HERE'S a *complete line* of packaged steam generating units that are built to power boiler standards . . . designed and constructed to offer these important savings.

You *save time* because they are shipped completely assembled, all ready to set on a simple foundation and connect to your fuel, steam and electric power lines.

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You *save money* because all units are shop fabricated from standard parts, simple to install, and designed for sustained high efficiency and exceptional ease of inspection and servicing.

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In addition to the standard units listed here, FW Packaged Steam Generators are also available for design pressures to 1300 psi, with superheaters giving up to 825 F final steam. FW extended surface economizers provide maximum efficiency at these higher pressures and temperatures. For complete information send for Bulletin No. PG-55-3. *Foster Wheeler Corporation, 165 Broadway, New York 6, N.Y.*

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Contains information on complete line of Chromalox Electric Heaters, elements, thermostats, contactors and switches. Gives uses, construction information and prices, plus basic heat calculation data and heat loss charts.

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latter, the pressure energy is converted into velocity energy, creating a suction effect at the throat of the ejector diffuser. This lifts the water through the foot-valve into the ejector. Upon leaving the ejector throat, the velocity energy is re-converted into pressure energy, lifting the water into the pump suction. Such an arrangement can be used even when the static lift exceeds the theoretical maximum of 34 ft which can be handled with a pump.

It may be that the size of a commercial ejector suitable for handling the required capacity of 100 gpm would exceed the diameter limitations imposed by the existing conditions. However, while the efficiency of a home-made ejector may suffer in comparison with that of commercial models, it is entirely possible to design such a unit to fit within the 2½-in. pipe. The suggested arrangement is illustrated on first page. The drive pipe, the ejector, the diffuser and a sealing plate are all nestled inside the suction pipe. Since the pump would no longer handle the water under a suction lift, all the troubles which occur at present would be eliminated.

Finally, in the event that the economics of the installation were to ultimately dictate the removal of the present bore pipe, it might prove that the most satisfactory solution would be to replace the existing centrifugal pumps with vertical turbine pumps. Their control would, of course, remain exactly the same as that for the present installation.

Electronics Training

(Continued from page 118)

minutes; also available in film strip; U.S.O.E. 353.

RCL Resistance Capicitance — Motion picture; U. S. Navy; 16 mm sound; Film Order No. MN 1540-c. Also film strip which supplements the motion picture and is identified by Order No. SN 1540-ac.

These film strips are not used in their entirety but portions are selected at the appropriate place in the course. In addition, many free films from various manufacturers are scheduled

Also, some of the manufacturers of the equipment that the students study, and which is used in the plant, come in and demonstrate their electronic controls.

Several books have been helpful to the instructor in covering the various subjects outlined for the 48-week electronics course. The two textbooks they are using are:

Industrial Electronics, by the Coyne Electrical School, distributed by Howard W. Sams, Inc.

Electronics in Industry, by George M. Chute, published by McGraw-Hill Book Co., Inc.

So far, 154 people from the Chrysler plants have been enrolled in the electronics training course. To date, there have been 86 graduates. Upon completion of the program, each participant is presented with a certificate by a representative of Chrysler Corporation's management.

In addition, the Technical Training Section, under the supervision of Dean T. Brown, notifies the Educational Supervisor at the respective plant, as well as the foreman or supervisor in the department in which the student works, that he has successfully completed the training course.

Caterpillar's P. E. Group

(Continued from page 95)

friction between machine feet and mount, as well as between floor and under surface of the mount.

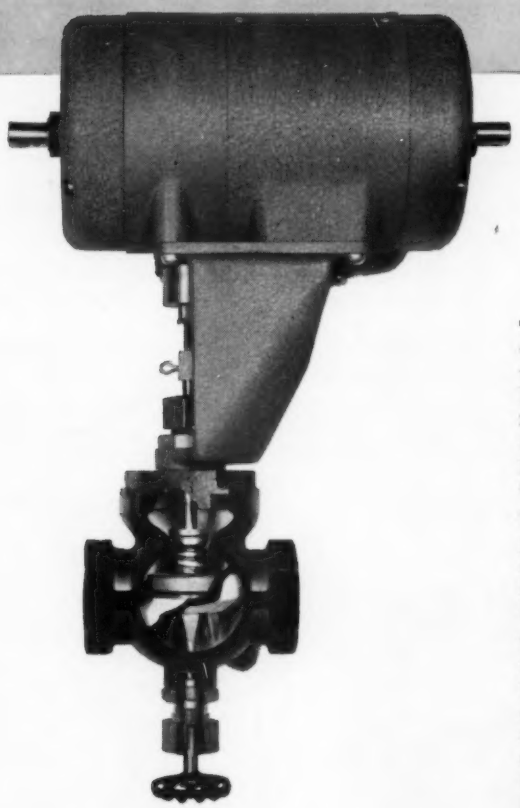
Although not in the original specs for the "production perfect" machinery installation method, two unforseen things happened when this method was used. First, time required for machinery installation was greatly re-

duced. It is no longer necessary to drill concrete floors, heat and pour lead, then give the lead time to set. Second, costs for re-locating machinery within the plant took a nosedive. It is now a relatively simple matter to move a machine which is not attached to the floor, place it in another plant location, using the same mounts. (The mount is engineered to provide resiliency which keeps it from taking a permanent set, and it resists water, alkali, oil, weak acids, etc.)

More and more of Caterpillar's production machines in Peoria are now being installed without bolts, without cement and without many of the headaches which can result from doing things "the same old way." It's a good example of Plant Engineering that means Profit Earned for a company.

NEW ACTIONATOR*

heavy duty electric motor for operating valves, dampers, louvers



The new Honeywell ACTIONATOR is a compact, lightweight, rugged and flexible industrial motor for operating valves, dampers, louvers, and other final control elements. Models are available for mounting on, and operating rotary valves or dampers. The ACTIONATOR is also available with cam operator and yoke. Internal strain release protects valve seats and gear train so that it can be used on practically any slip stem valve.

The ACTIONATOR is a reversing capacitor type motor and provides on-off, two-position, floating or proportional control. Shaft rotation can cover up to 180 degrees in 7½, 30, 60, or 120 second timings; torque ratings from 50 to 200 inch-pounds depending on motor speed.

The proportional control model provides slidewire resistances of 100, 135 or 1000 ohms, and can be used with any type of electric proportional controller. A second slidewire can be used for retransmission . . . to operate another motor, or for remote indication. Spst and spdt auxiliary switches can also be installed within the end bells. The enclosed terminal compartment is designed to meet J.I.C. standards.

Limit and auxiliary switches, specially designed by MICRO SWITCH, allow the ACTIONATOR to be used where ambient temperatures range from —20 to +150 F.

For complete information and specifications on the new ACTIONATOR, call the nearest Honeywell office, or write (send coupon) to:

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Phila. 44, Pa.

Industrial Division
MINNEAPOLIS-HONEYWELL REGULATOR CO.
Wayne and Windrim Avenues, Philadelphia 44, Pa.

☐ Please send me additional information on the ACTIONATOR.

☐ I'd like a Honeywell sales engineer to discuss applications of the ACTIONATOR in my plant.

Name_____

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MINNEAPOLIS **Honeywell**

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*Tradename Minneapolis-Honeywell Regulator Co.

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You wouldn't tolerate low voltage, but—

Do you have Full Air Pressure?

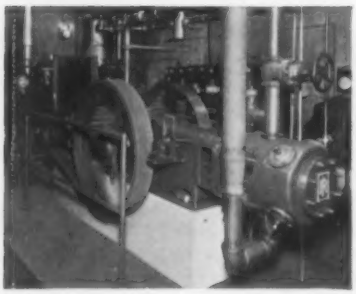
Every pound below design pressure drops air tool performance nearly 2%

Keep production going...use Ingersoll-Rand air tools and keep pressure up with Ingersoll-Rand compressors.

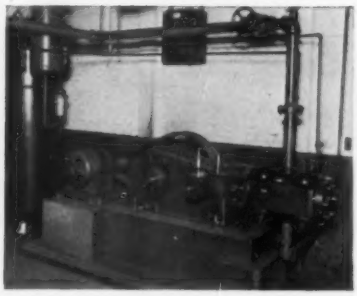
Perhaps an Ingersoll-Rand ES Compressor will build your Air Power System to full capacity

Modern, time-saving, labor-aiding air tools are designed to operate at a working pressure of 90 pounds. As the pressure falls off, so does the performance of the tool. Studies have shown that by increasing air pressure *at the tool* from 70 psi to 90 psi, you can increase the available power of the average air tool by 37%. This means a big increase in productivity—big savings in time and cost.

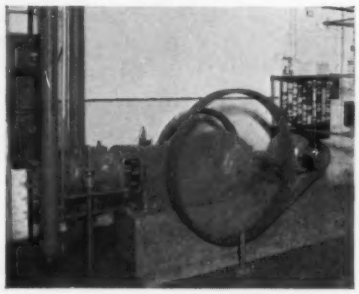
If your increased usage of compressed air has outstripped compressor capacity, an additional heavy-duty ES compressor will be a highly profitable investment. Your Ingersoll-Rand representative will be glad to help you make an air survey and recommend the most economical solution to the problem.



This Class ES compressor provides 100 psi air for operating air tools in the foundry and machine shop of a large manufacturing company.



For more than 15 years, this ES compressor has been providing a dependable supply of air at 100 psi for general plant service in an Eastern metal products factory.



Air tools used in a large woodworking plant are operated at top efficiency by the heavy-duty ES compressor shown above, delivering air at 100 psi.

Only I-R compressors have CHANNEL VALVES

Known for high efficiency, quiet operation and durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and leaf springs, with trapped-air spaces which cushion action.

Ingersoll-Rand

I-439

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BULLETINS

101	102	103	104	105	106	107	108	109	
110	111	112	113	114	115	116	117	118	
119	120	121	122	123	124	125	126	127	
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BULLETINS

(Begins on page 21)

155 Fractional Horsepower Motors — New developments in fractional horsepower motors and gear reduction units are shown in this 16-pp catalog. Also describes a complete line of speed reduction units, in open or closed type and single or double reduction. Dimensional diagrams and specifications are included. Rae Motor Corp.

157 Power Transformer Data—Form 427-R-1, 80-pp, is a transformer instruction booklet which should be of value to plant engineers concerned with power transformer maintenance and operation. Well-illustrated with photos, drawings and diagrams, booklet covers, in detail, such subjects as installation, operation, component parts, maintenance and inspection of power type transformers in all ratings. Included with the instruction book is an outline diagram, auxiliary wiring diagram and/or other pertinent information relative to the specific installation. Moloney Electric Co.

158 For Voltage Correction—Ways in which the Handi-Auto transformer can be used to help solve voltage correction problems are told in Bulletin 61B8490. Includes diagrams of connections for the transformer, along with mechanical information concerning the unit. Allis-Chalmers Mfg. Co.

159 Circuit Breakers — Six-page Bulletin 1004-A describes company's line of circuit breakers, including manually and electrically operated circuit breakers to be applied as switchboard breakers, individually enclosed breakers, one-high individually enclosed drawout units, and heavy-duty d-c circuit breakers. Cutaway view illustrating component parts is included, as well as a table of ratings. I-T-E Circuit Breaker Co.

160 Magnetic Starter Modification — Illustrated Bulletin GEA-6481, 12 pp, shows how to modify company's standard magnetic starters to fit special conditions. Includes how-to-do-it pictures of the installation processes with a push button and selector switch, auxiliary interlock, strongbox coil, third overload relay, and fuse clip kits. General Electric Co.

161 Industrial Truck Battery—Bulletin GB 1668-B, 8 pp, describes company's Super Dreadnaught batteries developed to fill power needs of electric industrial trucks. It gives full details of battery construction, including Tite-Seal posts, basic Z grids, regenerative oxide material, Platainers, glass retainers, rubber separators, and element protectors. It also lists engineering specifications and tabulates length and width dimensions for groupings of cells in wood or steel trays for rider-type trucks. Gould-National Batteries, Inc.

162 Battery Charger—Bulletin GEA-3179D illustrates and describes phano-chargers—adjustable self-regulating electronic battery chargers for maintaining storage batteries. Discusses operation, cites various advantages of the unit, and covers construction details with photos and text. Performance curves and a schematic diagram are included. General Electric Co.

163 Selenium Rectifiers—Bulletin GEA-6545, 12 pp, gives features, application, charts, construction, dimensions, specifications and other data on ¾ kw to 125 kw selenium rectifiers as well as multiples to 500 kw. Performance curves are included, as well as dimensional and rating tables. General Electric Co.

WATER, WASTE TREATING

165 Chemical Feeder—Bulletin 340-A features chemical feeding equipment for use in the treatment of waters and wastes. Lists advantages of the compact solution feeder which incorporates either one or two positive displacement diaphragm pumps, describes operation, offers suggested specifications. Infilco Inc.

166 Water Softeners — Publication 4801-A describes the versatility and economy of company's hot lime-zeolite softeners which are designed to provide zero hardness boiler feed water. Bulletin details method of operation, expected results, chemical savings and simplicity of operation. Cochrane Corp.

167 Automatic Water Filter—Bulletin 909, 10 pp, describes company's industrial water filters for complete automation, with cutaway sections and drawings to show the operation. Dimension charts and flow curves are given for all three sizes, and for Poro-Stone, Poro-Screen and Poro-Edge elements. Typical installation photographs are also included. R. P. Adams Co., Inc.

168 Cold Water Deaerator—Publication 4653 describes the many advantages of cold water deaerators and their principles of operation. Photos illustrate installations. Cochrane Corp.

BOILERS

170 Smaller Boilers—Bulletin 1233 describes Power-Pak packaged automatic boilers for steam or hot water heating and hot water service, in capacities from 8 to 25 hp, for pressures to 15 psi. Provides detailed illustrations of oil- and gas-fired units, lists features and advantages, and tabulates dimensions, weights, and ratings. Orr & Sembower, Inc.

171 Package Boilers—Twenty-pp Publication B-120 describes and illustrates company's package fire-tube unit boilers available with firing equipment selected to suit plant conditions, service facilities and most suitable fuels. Some typical installations are pictured. Special advantages of these units are detailed and dimensions and engineering data provided for both low-pressure and high-pressure models. Dominion Bridge Co., Ltd.

TUBING

172 Flexible Plastic Tubing—Bulletin T-97, 28 pp, covers Tygon formulations individually and in technical detail. Applications and limitations of each of these plastic formulations are presented, and physical properties and chemical resistance based on ASTM testing methods are given in charts and tables. Typical tubing applications are illustrated, and bore and wall combinations, available lengths and packaging data are presented. Plastics and Synthetics Div., The U. S. Stoneware Co.

173 Tubing System Tips—Catalog File 4305, 8 pp, contains information including charts and tables to aid in selection of tubing as to size, wall thickness and material for various operating conditions. Factors considered are flow requirements, pressures, severity of service and temperatures. Tube & Hose Fittings Div., The Parker Appliance Co.

174 Plastic Rods and Tubes—This 24-pp publication covers the available sizes and prices of rod and tube stock made of crystal clear methyl methacrylate, Teflon, cast acrylic, vinyl, polyethylene, cellulose acetate and polystyrene. Complete ordering data are supplied and specifications added where necessary. Friedrich & Dimmock, Inc.

175 Cabled Tubes—Bulletin 356, 12 pp, gives complete information on various types of cabled tubes for instruments and controls and methods of installation. Illustrations show regular copper and polyethylene tubes, as well as four corrosion-resistant types. Method of utilizing armored cable instrument tubing to provide better protected instrument lines at lower cost is detailed, and complete data is included, as well as tips on handling under all conditions. Crescent Insulated Wire & Cable Co.

METAL FINISHING

176 Why Hot Spray?—This informative 28-pp, pocket-size booklet lists major benefits of hot spray application of finishing materials and explains each benefit in detail. Case histories are cited to illustrate each benefit. Questions most frequently asked about hot spray are listed, with detailed answers. Booklet is illustrated. The SpeeFlo Co.

177 Barrel-Finishing — Complete descriptive and technical information on the barrel-finishing process, with company's abrasives, is presented in illustrated pocket-size Form 501. The booklet includes information on types of barrels, selection of abrasive, cleaners, time cycles, and other important facts about barrel-finishing. Includes before and after photos and case histories of actual examples of deburring, finishing for plating, and precision forming of radii to blueprint specifications. Norton Co.

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on the facing page.

MAINTENANCE

178 Cleaning Compounds, Solvents — This 8-pp illustrated bulletin gives detailed information and applications of chemicals for every industrial cleaning requirement. Products covered include a liquid steam charge for light and medium-duty steam cleaning, an emulsifiable liquid concentrate for cleaning and degreasing metal and concrete surfaces, a rust and scale solvent, and a liquid cleaner for cleaning corrosion, pit marks and oxidation from aluminum. Brulin & Co., Inc.

179 Floor Stain Removal—It's easy when you know how, can best describe this 8-pp illustrated booklet on how to remove stains from floors. Features easy directions telling what to do and what to avoid, materials needed and how to get them. First steps for general stain and spot removal from all floors are given, and then separate, specific instructions for soft floors, like asphalt tile, mastic, rubber, wood, cork, linoleum and magnesite, and for hard floors like concrete, marble, terrazzo, ceramic tile are listed. Huntington Laboratories, Inc.

180 Aids to Window Washing—Sixteen-pp Booklet 2022-A is of particular interest to plant engineers whose plants contain many windows and window walls. It describes equipment which is attached to buildings of all heights to let window washers raise or lower themselves and travel along walls to reach any window areas and wash them safely. Includes information on window washing cages for one or two men and for manual or electrical operation. Gives details on principal parts and fittings and provides engineering data showing how to locate track. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

181 Weldless Repairing—Technical Bulletin 14 describes a new method of making weldless repairs to iron and steel tanks, conduits, containers and surfaces. The method employs epoxy resin and glass cloth in a lamination procedure that gives good adhesion to the metal, rigidity and toughness of the repair job, and acceptance of paint. Smooth-On Mfg. Co.

SPECIALIZED EQUIPMENT

182 For Textile Mills—Form A-2139, 28 pp, describes natural and synthetic rubberized products for textile machinery, with photos and detailed information on a wide variety of items designed to improve spinning and weaving operations, reduce operating costs and increase profits. It covers products for spinning frames such as roll coverings, woolen and worsted cots, automatic cot grinders, long draft aprons, rub aprons, endless condenser tape and slasher rolls. The Dayton Rubber Co.

183 Textile Yarns—Eight-pp Form TYN-1 on company's textile yarns offers a description of the products and some end uses, and includes other information of interest to continuous glass filament yarn users. A yarn comparison table, listing glass fiber continuous-filament yarn data and equivalent yarn counts of cotton, worsted, and rayon is included. L.O.F. Glass Fibers Co.

184 For Fat Processing—Bulletin 2515, 24 pp, prepared especially for the animal and vegetable fats and oils industry, describes equipment offering top economy in the extraction and preparation of these products. Processes covered are extraction, refining, distillation, deodorization, fat splitting, hydrogenation, fatty-acid separation. In addition, numerous tables list performance and economics of typical installations. Blaw-Knox Co.

METAL INSPECTION

185 Flaw Location—"How to Perform Dye Penetrant Inspections" is a semi-technical booklet, designed as a manual for performing inspections by the penetrant process. Discusses every aspect of penetrant flaw location—pre-

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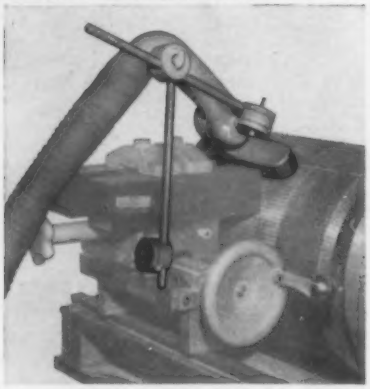

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BULLETINS

(Begins on page 21)

cleaning, applying, removing excess penetrant, applying developer and interpreting results. Turco Products, Inc.

186 Magnetic Particle Inspection—Form 151, 16 pp, outlines design and operation features of company's Magnaflux-Magnaglo Process for magnetic particle inspection. Describes two kinds of magnetism used in the process, as well as the various kinds of equipment used in the non-destructive testing method. Application in manufacturing, in quality control, production inspection, tool inspection, machinery and equipment maintenance, transportation and service industries—are fully described, and typical kinds of defects are pictured. Magnaflux Corp.

OTHER EQUIPMENT

187 Compressors, Engines, Turbines—Bulletin 131, 28 pp, describes a line of compressors, engines, and turbines for petroleum, gas, processing, general industrial applications. Construction features are described and illustrated with cutaway views, and dimensional data and diagrams are included. Covers gas-engine-driven compressors, steam-engine-driven compressors, motor-driven compressors, diesel-engine-driven compressors, centrifugal pipeline compressors, radial inflow turbines, centrifugal compressors, combustion gas turbines, axial flow compressors, others. Includes photos of typical installations. Clark Bros. Co.

188 Steel Buildings—Form 56-1-109 is a colorful 20-pp catalog detailing company's newly enlarged line of industrial and commercial buildings and accessories. Features a series of rigid frame structures, two 50 and 60 ft bow string truss buildings and the recently developed Stran-Satin metal wall. Illustrations of these easily erected buildings in use as manufacturing plants, warehouses, retail operations and municipal installations included. Stran-Steel Corp.

189 Mechanical Packings—Featured in 24-pp Catalog 56 are several recent packing developments including the multi-purpose Bel-Vee V-Ring packings, the long wearing Crisscross Braid packing series, twisted foil packings for oil and distillate temperatures to 1000 F, and an Inconel-wire reinforced plastic packing for valves handling superheated steam at temperatures up to 800 F. Packings for every industrial application are covered and a recommendation chart is included. The Belmont Packing & Rubber Co.

190 Dry Grinding Mills—Bulletin 17-C, 44-pp, contains descriptive and technical information on mills for dry grinding and pulverizing. Discussing proper application and selection of conical mills, tricone mills, cascade mills, rod mills, tube mills and disc roll mills for dry grinding problems, it also describes various air classifying arrangements and shows a number of plant flow sheets. Mill auxiliaries, such as feeders and electronic controls, are also described. Complete specifications for a number of dry grinding mills are given, as well as detailed performance data for a variety of materials. Hardinge Co., Inc.

191 Gas Burning Equipment—Catalog 57, 32 pp, pictures and describes company's line of furnaces, burners, valves, torches, mixers, blowers, stock tank heaters and controls. Complete specifications and shipping weights are listed for each item. Photos, drawings, diagrams, typical installation diagrams and other illustrative detail are included, as well as a table of capacities, orifice sizes for 2500 Btu propane gas. Johnson Gas Appliance Co.

192 How Standards Are Made—This 20-pp booklet discusses the three ways in which standards become nationally accepted and approved as American Standards. Tells who makes these standards and why, and who uses them. Explains why the American Standards Association exists, how it guards the democratic processes through which American Standards are developed, and how it operates. American Standards Association.

193 Silicone Rubber Selector—Bulletin AD 24 E is a "lightning selector" designed to facilitate a rapid, accurate choice of the proper silicone compound or gum in the rapidly growing family of synthetic elastomers. It lists major categories of silicone compounds and typical properties of each. Cross references to AMS and ASTM specifications are also included. General Electric Co.

194 Flash Lights, Safety Cans—Catalog 566, 16 pp, covers this company's flash lights, lanterns, safety lights, carbide lamps and safety cans. Provides a table of performance characteristics of bulb and battery combinations including burning life of batteries and correct bulbs to use with various dry cells, depending on amount of light and battery life desired. Book is divided into sections, dealing with general purpose lamps and lanterns; special lights for industrial plants, utilities, others; safety lights for use in explosive areas; safety cans for handling oily wastes and flammable liquids; and carbide lamps. Justrite Mfg. Co.

Among this Month's New Literature of Merit . . .

195 When Disaster Strikes—Twelve-pp Bulletin GEA-6484 tells how company's apparatus service shops can help speed plant recovery following emergencies. Bulletin describes procedures for recovery of vital electrical equipment damaged by flood, fire, water, wind, and other natural forces. Suggestions serve as a guide in helping industries and utilities resume production quickly—prior to contacting the service shops. Includes such topics as basic electrical steps toward restoring production, and procedure for reclamation of high-priority electrical equipment. General Electric Co.

196 Tap Primer—Form T-243 is a 72-pp, pocket-size tap primer, designed to fill the need for basic information on taps, their uses and descriptions. Information is presented in simple terms which will help clarify the science of tapping for the newcomer to the metalworking scene as well as act as a refresher and reference for the old hand. Covers characteristics, qualities and features of taps of various design and purpose, and is fully illustrated. The Threadwell Tap & Die Co.

197 Induced Draft Fan Data—In addition to providing an illustrated discussion of design advantages of company's induced draft Bifucator, 20-pp Bulletin DB-44-56 is an excellent working tool on fan selection. Two methods are presented, along with detailed examples of each. Also included are boiler code ratings of various organizations expressed in Btu/hr, and charts on draft losses. Dimensional diagrams are provided, as well. Typical installations of Bifurcators are pictured. DeBothezat Fans Div., American Machine and Metals, Inc.

198 To Step Up Production—Eight-pp Bulletin K7A shows, by case histories, how profits and production can be increased through the modern concept of vibration and noise control machinery mountings. Describes how company's mountings permit most efficient plant layout, make possible utilization of all available space, prevent rejects, and eliminate down-time, as well as cutting employee absenteeism and increasing efficiency. The Korfund Co., Inc.

199 Hose Reels—Design and manufacture of hose reels for every use are highlighted in this 20-pp catalog. Prepared as a selection aid, catalog describes features of company's standard hose reels, and cites facilities available for custom manufacturing to various specifications. Applications in fire fighting equipment, fuel delivery, industrial applications, LP-Gas delivery equipment, and others are cited. Clifford B. Hannay & Son, Inc.

200 Rescue Equipment—A complete line of hydraulically operated rescue equipment for use in releasing victims trapped in wrecked vehicles, under debris, and in burning buildings is described in 12-pp Catalog HR-300. Pictures show how victims are freed by Porto-Power from a wide variety of disaster situations. Blackhawk Mfg. Co.

201 Heat Exchangers—Alcotwin fin-tube heat exchangers are presented in 8-pp Bulletin FH-3. Discusses heat-transfer characteristics of the longitudinal fin tubes, which feature U-shaped fin channels integrally bonded to the tubes by heliarc welding. Includes a table of dimensions, a type designation table, and finside coefficient and finside pressure-drop charts for all sizes of exchangers. Alco Products, Inc.

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71 WEST-ING-ARC units are now on the automated production line at the new Sterling, Michigan, FORD plant.

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 229-230.

BOILERS, GENERATORS

301 Steel Boilers—Revised General Catalog 80, 32 pp, is a condensed but complete product guide on company's high and low pressure steel boilers. Also included are full descriptions and illustrations of water heating products, both direct fired and storage types as well as indirect water heating coils. Pages on boiler support brackets, structural steel suspension and induced draft fans, as well as pictures of installations are included. Kewanee-Ross Corp.

302 Packaged Boilers—This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information, is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 40,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

303 Self-Contained Boilers — Bulletin AD-144 reviews company's new CB boilers. Illustrations include installations, demonstrations. Engineering articles are featured covering such subjects as low noise level. Cleaver-Brooks Co.

304 Standard Generators — Bulletin B-55-4 describes company's SC economy series of standard steam generators designed to reduce steam costs for industrial plants. Pre-engineered, standardized steam generators offered in nine sizes, with capacities of from 50,000 to 150,000 lb per hour are described, and schematic and cutaway drawings of the units and design features are included. Foster Wheeler Corp.

PUMPS, COMPRESSORS

305 For Hazardous Liquids—Catalog Section D, 12 pp, presents company's line of Underwriter rotary pumps for hazardous liquids. Both mechanical seal and deep stuffing box models are shown and dimensions and specifications provided. Various mounting arrangements and drives available for these UL approved pumps are also cataloged, and application suggestions are given. Also in this booklet are performance graphs. Viking Pump Co.

306 Solids Handling—Bulletin 121-A, 8 pp, describes non-clog pumps for handling solids in suspension. Included are vertical, horizontal and close-coupled types used to handle liquid components of industrial processes, industrial waste, and for such pumping applications as water supply, drainage and sewage handling. Specifications are included. Aurora Pump Div., The New York Air Brake Co.

307 For Abusive Pumping Jobs — Catalog 4906, 36-pp, covers centrifugal pumps for wide, industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

308 Continuous Flow Pump—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes photos, diagrams and specifications. Robbins & Myers, Inc.

309 Wet Pit Pumps — Sixteen-pp Catalog 3007 covers heavy-duty pumps for drainage, flood water, effluent boiler blow-off, hot wells, acids and alkalis. Illustrations, tables and text give design features of these wet pit pumps. Catalog also includes a condensed version of the Standards of Hydraulic Institute data section listing metals used in constructing pumps for handling various liquids. Also suggests factors to be considered in pump selection. Yeomans Brothers Co.

310 Condensation Pumps—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. Dunham-Bush, Inc.

311 Solids Handling—Bulletin 121-A, 8 pp, describes non-clog pumps for handling solids in suspension. Included are vertical, horizontal and close coupled types used to handle liquid components of industrial processes, industrial waste, and for such pumping applications as water supply, drainage and sewage handling. Specifications are included. Aurora Pump Div., The New York Air Brake Co.

312 Close Coupled Pumps—Revised Bulletin 242 describes design and operation advantages of company's close coupled pumps for industry, and includes large cutaway views illustrating component features. A composite rating table is included, as well as dimensions and other data. Warren Steam Pump Co., Inc.

313 Gas-Engine Driven Compressors — A two-cycle turbocharged compressor is described in 24-pp Bulletin 134. Stresses economy of installation and operation afforded by this gas-engine driven unit, lists other advantages. Explains how turbocharging saves on fuel and cooling. Design and construction features are discussed. Clark Bros. Co.

314 Compressors — Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

315 For On-the-Spot Air — Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

PACKINGS

316 Packings for Chemicals — Dura Plastic Teflon packing for sealing applications in the handling of corrosive chemicals is introduced in Bulletin 461 M.D. Stresses heat resistance of the material, chemical inertness. Discusses construction details and lists packings for use with specific chemicals. Durametallic Corp.

317 Industrial Packings—Performance characteristics and applications of company's packings are described in 18-pp Catalog PC-102, covering self-lubricating packings, molded packings, sheet packings and gaskets, folded asbestos packings and gaskets, asbestos rope and wick. Photos, cutaway views showing construction features, and dimensional data chart are included. Greene, Tweed & Co.

319 Lubricant Data Book — The 16-pp current edition of this company's popular Lubriplate Data Book offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants under normal and special conditions are provided. Several pages are devoted to lubricant recommendations for equipment used in a variety of industries—bottling plants, chemical and food processing, metalworking, iron and steel plants, textile plants, woodworking, pulp and paper machinery, sewage disposal plants. Lubriplate Div., Fiske Bros. Refining Co.

320 Lubricants—Specification, Classification—Vital information on selection of lubricants is presented in 10-pp Vol. 41, No. 4 of "Lubrication." Covers such items as performance specifications, initial suitability of lubricants, quality of lubricant, effect of lubricant on production, effect on maintenance, effect on power, effect on cost, and features a look to the future. The Texas Co.

321 For Better Lubrication—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in this pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

322 Centralized Lubrication — Pocket-sized 24-pp, Form 34-22, called "Ask Anyone in Industry" describes in comic-book form the hazards and inefficiency inherent in conventional lubrication practice and promotes use of centralized lubrication — in the form of Alemite Accumeter measuring fittings. Shows how these are connected by tubing to a lubrication pump which is controlled by a timer. Alemite Div., Stewart-Warner Corp.

323 Centralized System—Bulletin 806-R, 8 pp, features an automated power-drive centralized lubrication system designed for positive, reliable lubrication of automated machine groups or components. Types of installations are diagrammed and described and dimensions and other specifications are given. Covers air-operated lubricant pumps, central priming pump systems, automatic alarm systems, lubricant injectors, and controls and accessories. Lincoln Engineering Co.

MECHANICAL POWER TRANSMISSION

324 Roller Chains, Sprockets—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

325 Power Transmission Equipment—Form 118, 24 pp, gives descriptive and technical information on variable speed pulleys, wide V-belts, sheaves, motor bases, countershafts, and Select-O-Speed transmissions. Illustrated with photos and dimensional drawings, booklet provides ratings, sizes, application and installation tips. Lovejoy Flexible Coupling Co.

326 Sprockets and Chain—Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Corp.

327 Power Drives—Book 2447, 28 pp, features company's line of gearmotors and Motogears, and includes selection data together with features of construction, load classifications, dimension tables, overhung load ratings and mounting assemblies. Design features are illustrated through photos and cross-sectional views and dimension drawings included. Link-Belt Co.

328 Spacer Coupling—Of special interest to plant engineers concerned with operation of many pumps is Manual 4838 on this company's Type F Steelflex spacer coupling which has a quick-disconnect feature. Step-by-step illustrations show how to install, remove coupling and lubricate it during assembly. Process pump selections are tabulated, dimensional data included. The Falk Corp.

329 Flexible Couplings — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

330 Improved V-Belts—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide

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DATA FILE

(Begins on page 234)

less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

331 **Adjustable Speed Drives**—Bulletin PB-4700-1 describes company's packaged adjustable speed drives—covering latest developments in design and construction. Tells how these packaged, pre-wired, pre-assembled units provide flexibility of d-c motor performance from an a-c power supply, and offer simple, convenient speed adjustment without intermediate speed changing equipment or line shafting. Crocker-Wheeler Div., Elliott Co.

332 **Fluid Drive** — Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables are provided for direct connected and V-belt types. American Blower Corp.

333 **Fluid Couplings**—Bulletin 144-D, 14-pp, presents complete installation and performance data on fluid couplings. Illustrated with diagrams and drawings, bulletin shows ease of applying company's fluid couplings on any type industrial equipment, powered by any type electric motor or internal combustion engine from ¾ to 850 hp. Describes standard models providing standard input, output combinations, and standard models in packaged units. Installation hook-ups are given, along with typical applications. Twin Disc Clutch Co.

CONSTRUCTION

334 **Glass for Industrial Use**—How glass is used and how to choose the proper type for the application are covered in 12-pp Catalog 56-1. Discusses glass according to function; light diffusion and glare reduction; decoration; protection; and heat absorption. Photos showing various finishes and typical installations are provided, along with performance data, selection and installation tips, light transmission ratings and other data. General advantages offered by company's line of glass are also detailed. Mississippi Glass Co.

335 **Glass Blocks** — This 24-pp catalog describes company's glass block and its functions, and lists various glass block patterns manufactured, including light and solar heat controlling blocks, with details on functional advantages of each specific pattern. Included are instructions and construction details for both large and small-size panel installations in steel, wood frame, brick or brick veneer construction. Table of dimensions; a section on how to calculate illumination and brightness; and tables on solar heat control and fuel savings included. Owens-Illinois Glass Co.

336 **Fiberglass Reinforced Panels**—This file of bulletins covers fiberglass-reinforced panels for a wider range of industrial glazing jobs. Data is provided on shatterproof panes, Fire-Snuf panels, and metal-reinforced security panels. Strength test reports and physical data as well as information on light transmission qualities are included. Resolite Corp.

337 **Window Modernization**—How to modernize old windows with company's glass blocks is told in 8-pp Bulletin GB-104. Selection data is included, along with photos of typical installations. Pittsburgh Corning Corp.

338 **How to Glaze with Plexiglas**—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

339 **Panel Wall Construction**—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q-35-55. Includes installation photos, diagrams, specifications, as well as drawings, pointing out structural details. H. H. Robertson Co.

340 **Data on Panel Material** — This 12-pp booklet is a new edition of a guide to the use of Presdwood. Generously illustrated with drawings and photos, it describes basic and special Presdwood products and their prop-

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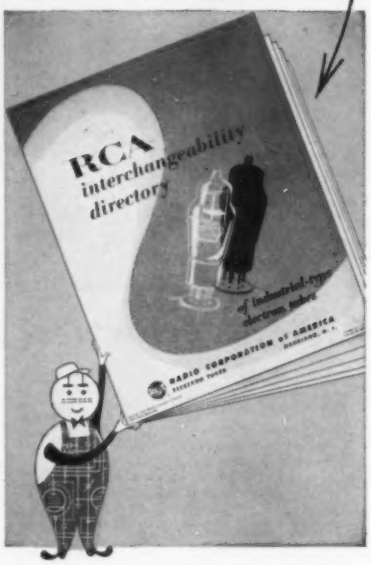

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DATA FILE

(Begins on page 234)

erties, tabulates available sizes, describes working and finishing methods, and illustrates various finishes. Masonite Corp.

341 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

342 **Metal Grating Handbook** — Sixteen-pp Form 500 is data and specification manual covering all types of grating, open steel floor armor, stair treads, vessel liners, decking and drain grates. Contains safe load tables for basic types of gratings, panel width constant charts, tables on standard widths and types of steel treads, types of anchors used for grating. Klemp Metal Grating Corp.

343 **Steel Grating and Treads**—Bulletin 2486, 16 pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety, pictures applications. Blaw-Knox Co.

344 **Floor Surface Hardener**—Bulletin SH56 describes preparation of Emeri-Topcrete, a hard surface flooring made with company's Type SH Cortland Emery aggregate. Includes recommended specifications and estimating data. Materials, mixing, application and curing information is given. Walter Maguire Co., Inc.

345 **Air Tools, Paving Breakers**—These two bulletins describe company's latest models of paving breakers and air tools for plant construction and maintenance work. Bulletin PB1 gives features and specifications on heavy-duty, medium-weight and lightweight paving breakers, as well as tools for use with them. Bulletin ST-100 describes and gives specifications for clay spaders, trench diggers and backfill tampers. Gardner-Denver Co.

MAINTENANCE

346 **Basic-Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job. Johns-Manville.

347 **Hot-Dip Galvanizing**—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance. American Hot-Dip Galvanizers Assn., Inc.

348 **On Rust Prevention** — This 1956 General Catalog, 38-pp Form 255, presents a treatise on rust prevention with illustrations of Rust-Oleum uses and applications throughout industry. Included are 102 color chips showing variety of colors available in primers, short oil type coatings, oil field finishes, restful color group finishes, machinery and implement colors, long oil type coatings, calvinoleum coatings, heat resistant coatings, chemical resistant coatings. Rust-Oleum Corp.

349 **Protective Paint**—Thirty-five case histories of successful use of protective coatings based on chlorinated rubber are included in this 20-pp bulletin, "Protection With Parlon." Photos show water and sewage works, paper mills, storage tanks, and chemical and food processing plants where these coatings have had long-term exposure to corrosive environments. Includes performance data, instructions for application. Hercules Powder Co.

350 **Insulation Coating** — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or com-

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Quick, clean, dry all-weather construction for modern insulated walls

Q-Panel walls are handsome in appearance and have better insulation value than 12-inch slow, expensive masonry walls. They go up fast because they are hung—not piled up—and in any kind of weather. Crews have installed a mile in a week. These sturdy steel or aluminum panels are permanent, yet they can be demounted and moved at will. Use the coupon below to write for literature.

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LIMBEROLLERS, at work on conveyor at Massachusetts Broken Stone Company.

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DATA FILE

(Begins on page 234)

position surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe. J. W. Mortell Co.

351 **Paint Work Book**—Bulletin 760, about 12 pp, is a practical manual giving painting data in charts, tables, diagrams and illustrations. Factors relating to use of company's protective coatings in mild to severe corrosive service are covered. Coatings and related primers are presented, along with surface preparation, priming, application methods and maintenance instructions. Care and cleaning of brushes and spray equipment is explained. A table gives chemical resistance rating of each coating to over 200 corrosive agents. Limitations of each coating are also given and cost factors cited. The U. S. Stoneware Co.

352 **Building Maintenance** — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instruction for applying them. Flexrock Co.

353 **Better Floor Care** — This illustrated folder describes products designed to aid efficient floor care. Lists combination Scrubber-Vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers and cleansers. Finnell Systems, Inc.

354 **For Fast Floor Repairing** — This illustrated bulletin covers Kwik-Roc, a fast and tough hardening material for repairing holes and cracks in concrete floors. Tells how to prepare surfaces for Kwik-Roc, how to mix, place, and store it. Includes service recommendations. A. C. Horn Co., Inc.

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355 **Industrial Vacuum Cleaning** — Twelve-pp Bulletin 155 B describes both stationary vacuum cleaning equipment and portable industrial vacuum cleaners, the latter in both light- and heavy-duty types. Recent improvements in collection and dumping methods are covered, and photos show application to conveying, reclaiming, bench work and removal of water. Specifications and ratings are included. Spencer Turbine Co.

356 **Light Scaffolds** — This series of illustrated bulletins describes company's line of aluminum alloy Up-right scaffolds and accessories. Pictures one-piece sections and multi-section models with various ranges of adjustability. Points out such features as locking hooks which provide automatic security and locking casters for safety on stairways and inclines. Up-Right Scaffolds Div., Up-Right, Inc.

FANS, VENTILATORS

357 **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data on Tubeaxial and Stack-booster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

358 **Industrial Fans**—Bulletin 702A features company's line of fan equipment for industrial air and material handling applications. Photos illustrate various types available, and complete descriptive detail and a table of general data are included. Clarage Fan Co.

359 **Induced Draft Fans**—Eight-pp Bulletin D B-32-53 provides engineering information on manufacturer's Bifurcator fans for providing controlled draft for boilers and furnaces. Gives

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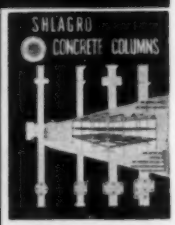

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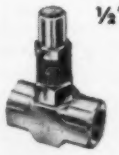

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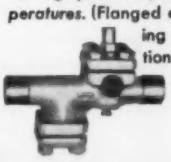

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DATA FILE

(Begins on page 234)

construction details, sizes. Illustrated with photos, diagrams of suggested methods for installation. DeBothezat Fans Div., American Machine and Metals, Inc.

360 **Roof Ventilators**—Sixteen-pp Bulletin A-112, revised, covers manufacturer's line of reversible roof ventilators, also penthouse Vertijet, rotary and other models. Sizes, specifications, performance data and dimensional drawings are included. Hartzell Propeller Fan Co.

361 **Industrial Fan Selection**—Of interest to plant engineers requiring quick, accurate selection of industrial fans for specified capacities, 28-pp Bulletin EX-531 contains selection tables from which correct fan for required capacity can be determined. Complete descriptive information, detailed capacity tables and dimensional data are included. Introduces a new fan offering improved efficiency. Bayley Blower Co.

362 **Ventilating Equipment**—A 36-pp guide to selection of propeller fan type ventilating equipment, Catalog 152 includes specifications and installation data on company's propeller fans in portable, tubeaxial, centrifugal, roof ventilator and other types. Detailed illustrations of construction features accent design and performance factors. Case study photos show installations. Ilg Electric Ventilating Co.

DUST CONTROL

363 **Dust Control, Blast Cleaning**—Bulletin 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of application. Pangborn Corp.

364 **Dust Control**—"Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

365 **Dry-Type Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

366 **Dust Filter**—Design, application and benefits of company's AC dust filter are described in illustrated 26-pp Bulletin 559. Filter performance curves, principle of air filtration, filter comparison charts, woven vs felted filtering media are featured, along with technical data on design, capacity ratings, dimensions, velocity, air volume and pipe friction tables. Installation photos and drawings of typical equipment layouts are included. The Day Co.

367 **Dust Collectors**—Various models of company's Multi-Wash dust collectors are featured in this interesting file of bulletins. In each case, bulletin describes performance characteristics and points out advantages, with a cutaway photo of the unit showing internal features. Capacities, dimensions and approximate weights are tabulated. Claude B. Schneible Co.

368 **Dust Control Systems**—Valuable engineering data on methods of dust control as well as descriptions of company's line of dust collectors are contained in illustrated Bulletin 636-2. Specifications on all models are included. A special section tells how to design your own system. Aget Mfg. Co.

369 **Dust Collectors**—Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

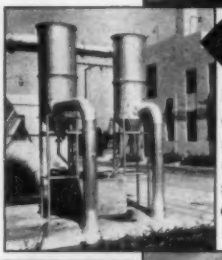
370 **Flexible Hose**—A set of five bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions,

Inside—Outside Topside!

MULTI-WASH
DUST COLLECTORS need no productive floor space

Inside

How Multi-Wash collectors can be installed, up off the floor, inside the building.



Outside

Installation of collectors outside the plant, conserving floor space for productive work.

Topside

Battery of Multi-Wash units installed on the roof of a large production factory.

Schneible Multi-Wash Collectors were designed to save money in many ways. Not the least, is the variety of methods of installation. In a majority of instances Schneible installations are operating without taking away any valuable production space.

This means profit from every foot of floor space, plus cleaner, more healthful working conditions that increase productive effort.

Specify Schneible Dust Control for simplicity and efficiency.

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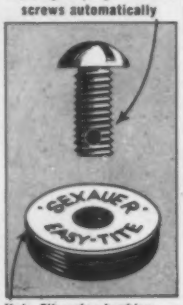

Note Fiberglas backing — resists closing squeeze

Now, NEW Pat'd. "Sexauer" SELF-LOCK screws, with expanding NYLON PLUG imbedded in the threads, fasten and *lock* at correct depths AUTOMATICALLY, hold faucet washer *firmly*. Made of rust and corrosion resisting Monel, heads won't twist off, screw slots won't distort; they can be used over and over.

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DATA FILE

(Begins on page 234)

technical data and prices on hose, duct and accessories. The Flexaust Co.

371 **Tubing for Many Jobs** — Flexible tubing for ventilation, fume and dust removal as well as materials handling is described in 8-pp Catalog C2-4. Gives detailed information on company's Spiratube A and Spiratube R, two types of lightweight tubing made from continuous helical coils of spring wire wound with fabric. Gives uses. Flexible Tubing Corp.

372 **Hydro-Filter** — Bulletin 556 describes outstanding features of company's hydro-filter for industrial dust collection. Cutaway view shows construction and design details, and diagrams showing dimensions and a table of capacities included. National Dust Collector Corp.

STORAGE EQUIPMENT

373 **Adjustable Shelving**—How this shelving can save assembly time is explained in 28-pp Form 2111. Photos and drawings of various types of shelving units, including open and closed shelving, bin units, ledge shelving, counter shelving, cabinets with swinging and sliding doors, parts and accessories are included. Standard Pressed Steel Co.

374 **Storage Shelving**—Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, other shop equipment. DeLuxe Metal Furniture Co.

375 **Steel Lockers**—Catalog L-100A, 20 pp, features a complete line of steel lockers designed for safer storage, longer life and better housekeeping. Contains descriptions, illustrations and specifications for various types of units and storage combinations to suit a variety of different installations. Penco Metal Products Div., Alan Wood Steel Co.

376 **Storage Equipment** — Catalog 100-E, 72 pp, illustrates and describes company's complete line of steel cabinets, folding chairs, chests and safes, stools, tool boxes, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and other specifications. Photos illustrate some typical equipment installations. Lyon Metal Products, Inc.

MATERIALS HANDLING

377 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

379 **Cranes for Big Jobs**—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, also specifications. American Hoist & Derrick Co.

380 **Overhead Cranes**—Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Features which contribute to efficient operation and low maintenance costs are detailed. Electrical information included. Chicago Tramrail Corp.

381 **For Overhead Handling** — Booklet 2008-M, 12 pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track sections are included. Among subjects covered are various carriers for hand, electric and automatic operation; tractors; track switches; standard cranes, transfer cranes and gantry cranes; safety electrification; buckets

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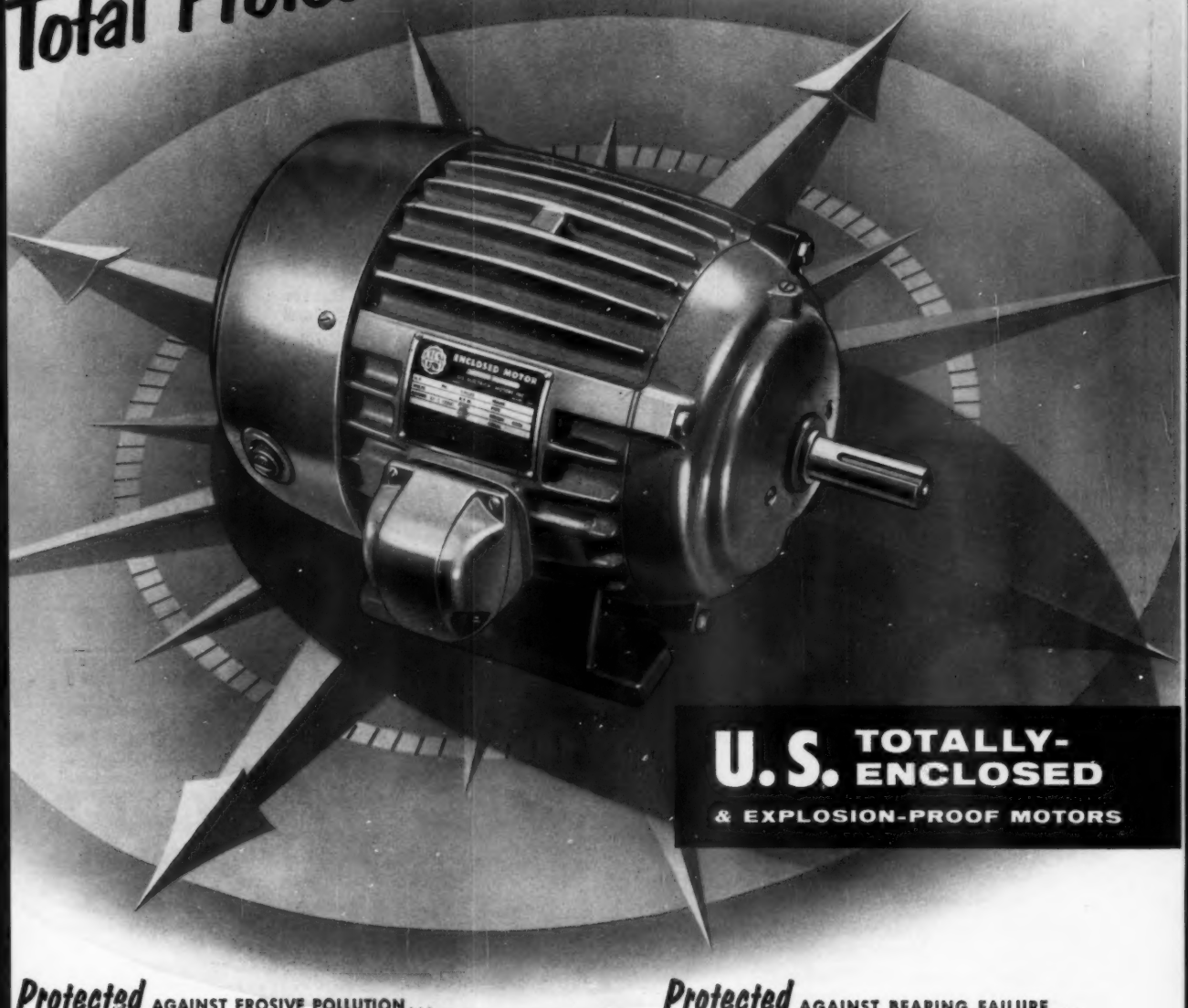

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For more facts circle 672 on Reply Card

DATA FILE

(Begins on page 234)

and grabs. Cleveland-Tramrail Div., The Cleveland Crane & Engineering Co.

382 **How to Choose a Crane**—Designed to aid in the selection of overhead cranes, 8-pp Unit 79 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances. Gives 14 safety features. Whiting Corp.

383 **Steel Conveyor Belts**—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

384 **Engineered Conveyor Systems**—Catalog 835, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyer Co.

385 **Floor Type Conveyors**—Catalog 51, 90-pp, contains engineering data on company's line of floor type conveyors, including belt conveyors, apron conveyors, bulk handling conveyors, chassis assembly conveyors, drag conveyors, flight conveyors, foundry block conveyors, log conveyors, mould conveyors, package handling conveyors, piano hinge conveyors, and others. Also covers other conveyor equipment such as conveyor chains, inclines and declines, cross sections, switches, sprocket turns, take-ups. Catalog is profusely illustrated with photos, drawings. Jervis B. Webb Co.

386 **Fork Truck Efficiency Test**—This 8-pp article explains how to tell when fork trucks need corrective measures. Lists equipment and facilities necessary for truck testing, tells how to test traveling efficiency and hoist speed measurements, shows suggested test data forms. Mercury Mfg. Co.

387 **Electric Fork Trucks**—Two electric fork trucks designed for high maneuverability, ease of maintenance, and operator comfort and convenience are introduced in two 6-pp bulletins. Bulletin 1324 covers a 4000-lb. capacity model; Bulletin 1325, a 6000-lb. truck. Performance, specifications, dimensions, details on controls and construction are given, features explained, and attachments shown. Baker-Raulang Co.

388 **Lift Truck Work Kit**—A method of predetermining the time necessary for fork lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as in planning for future needs. Includes typical materials handling examples to show technique for application of the data, as well as charts providing times for basic truck motion elements. The Yale & Towne Mfg. Co.

389 **Electric Freight Elevator**—Bulletin A-414, 12 pp, contains design and operation information on company's plunger electric freight elevator designed for low-rise, light and heavy duty freight handling requirements. A sectional diagram points out component parts, and an installation diagram and size and capacity table are included. Otis Elevator Co.

391 **Oil-Hydraulic Lifts** — Catalog RE-203, 20 pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank for powering oil-hydraulic devices. Illustrates lift platforms, platform accessories and safety devices, jacks, power units. Rotary Lift Co.

392 **Handling Baskets** — Bulletin B-54 describes company's complete line of standard and custom-engineered Eezy-Stak parts handling baskets, for machinery, washing, plating. Wire & Iron Products, Inc.

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Better PIPE TOOLS

CHAIN TONGS

"Reversible," "Standard" and "Ideal" types in all sizes. Jaws are drop forged from special steel, are carefully milled, heat treated, hardened and tested. The Handles are forged spring steel. The Chains are proof-tested to ⅔ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. "Standard" Jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes—fittings, etc.

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Works in seconds! Loosens Rusted Bolts nuts, screws, "frozen" parts .... without breakage!

LIQUID WRENCH

A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

Makes joints LEAKPROOF!

7 BASIC BLENDS

TiteSeal GASKET & JOINT SEALING COMPOUND

Makes all assemblies leakproof and pressure-tight. Easy to apply with brush-in-handle.

- NON-SOLVENT—WILL NOT HARDEN
- WILL NOT SHRINK, CRACK OR CRUMBLE
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Get them from your Automotive, Hardware or Plumbing Wholesaler!

RADIATOR SPECIALTY CO.
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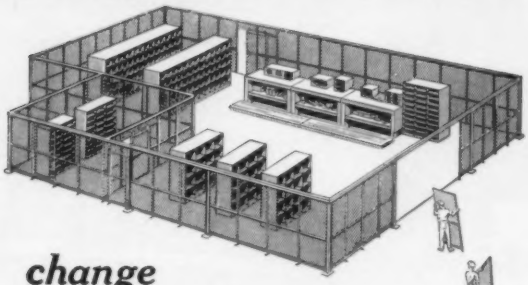
A NEW DEPARTMENT OVERNIGHT..SET UP WITH WIPCO WIRE PARTITIONS



change or relocate anytime!

WIPCO standard wire partitions come to you ready for immediate installation. Quickly and easily erected by your own men, Wipco wire enclosures are the practical solution to plant layout problems. They are readily disassembled and reinstalled in new locations as needs require.

A rigid wall of tough, machine-woven steel wire, Wipco enclosures protect against theft and loss, permit full ventilation and visibility . . . are economical to maintain, easy to paint and clean. Standard size sections and accessories are available from factory stock to meet nearly every requirement.

For greater efficiency . . . greater flexibility in plant layout—check into Wipco wire partitions today.

WIRE PARTITIONS AND ENCLOSURES FOR:

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- Tool Rooms
- Departmental Divisions
- Experimental Rooms
- Corridors
- Locker Rooms

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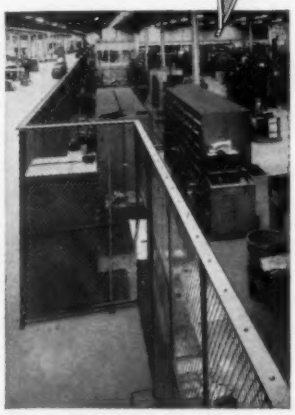

WIPCO WIRE PARTITIONS

WIRE AND IRON PRODUCTS INC.
1731 SIXTEENTH STREET • DETROIT 16, MICHIGAN

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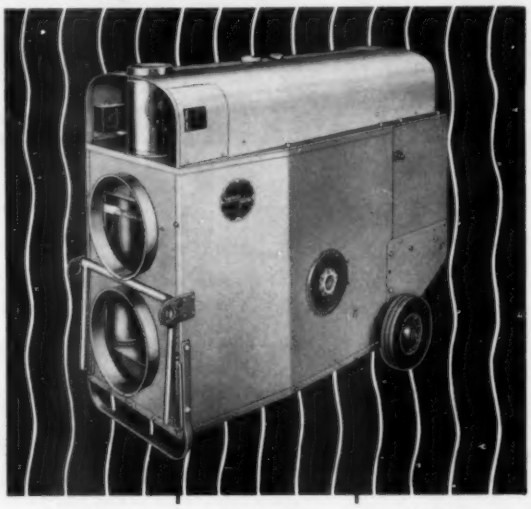
Today's Biggest Value in portable heat!



Fully Automatic | Completely Safe | Always Dependable

HERMAN NELSON "DE LUXE" portable heater

The "De Luxe" is the super-output heater, safety-engineered by Herman Nelson. Capacity sufficient to heat 25 ordinary rooms at once. Fully automatic—just a flick of the switch to get automatic ignition, automatic temperature control. This finest of all portable heaters has totally enclosed stainless steel combustion chamber—no smoke, soot or open flame. Combustion fumes are vented outside working areas. Heat output is 280,000-450,000 BTU per hour.

AAF herman nelson

GET FREE WEATHER FORECAST SERVICE, SEND COUPON!

AMERICAN AIR FILTER CO., INC., PORTABLE PRODUCTS Dept. 84
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Rush complete literature on portable heaters. Also send me your monthly Weather Forecast Chart, at no cost or obligation.

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You will get definite savings in maintenance costs when you use DURAMETALLIC spiral or die-molded ring packings. Durametallic means long uninterrupted sealing service with less wear on rods, shafts, sleeves or stems.

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Durametallic Products are "Engineered For The Job"

The PERFECT SEAL

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Meet Any Flow Conditions
of Pressure · Temperature · Corrosion

W.S. ROCKWELL
Butterfly Valves
for Tight Shutoff—
Throttling—Regulating

Minimum pressure drop • Self-cleaning • Compact • Lighter weight • Less space • Easy to install.

Made in all sizes from 4" to 144"; pressures to 300 p.s.i. and higher, in any metal or rubber covering; with any manual or automatic operators. There's a wide choice for your applications on air, gases, liquids or solids. Write for Catalog.

W. S. Rockwell 12" heavy duty butterfly throttling valve for 100° F. water in oil refinery; cast steel body, stainless steel disc and shaft, mechanical air operator, valve positioner and handwheel.

ROCKWELL SINCE 1888 BUILT

W. S. ROCKWELL COMPANY

BUTTERFLY VALVES • SLIDE VALVES • AUTOMATIC VALVES

2926 ELIOT STREET • FAIRFIELD, CONN.

Sales Representatives in Principal Cities

For more facts circle 694 on Reply Card

DATA FILE

(Begins on page 234)

394 **Casters and Wheels**—Catalog 138 is a 191-pp product manual on company's line of casters and wheels, describing design features and listing full specifications. Photos and drawings are used profusely to illustrate data, covering furniture casters, wheels, glides, desk shoes and various accessories. Darnell Corp.

SLING CHAINS, WIRE ROPE

395 **Industrial Wire Rope**—Bulletin DH-128D, 24 pp, features wire rope recommendations for industrial services. Covers more than 120 types of wire ropes used in construction, conveyors, cranes, dredges, steel mill and blast furnaces, coal bridges, guy ropes, inclines, platform lift trucks and winch lines. Each recommendation covers such points as rope diameters, construction, preforming, lay, grade and core. In addition, charts covering weights and breaking strengths are provided. American Cable Div., American Chain & Cable Co., Inc.

396 **Sling Chain Handbook**—Illustrated Data Book 100, 32-pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights, and working load limits under many conditions. Columbus McKinnon Chain Corp.

397 **Splicing Wire Rope**—Instructions covering the methods used in making various types of wire rope splices are fully detailed in this 16-pp bulletin. Each step in the operation is described and illustrated with easy-to-follow drawings. Additional data is given in the form of tables. Macwhyte Co.

INSTRUMENTS, CONTROLS

399 **Automatic Controls**—Mercury-switch equipped controls for heating, refrigeration, air conditioning and other industrial uses are presented in 52-pp Catalog 856. Fully illustrated, book provides ordering and application information on a variety of pressure controls, temperature controls, level controls, limit and fan controls, and many others. Also presents data on relays, and on tilting-type and magnet-operated mercury switches. The Mercoid Corp.

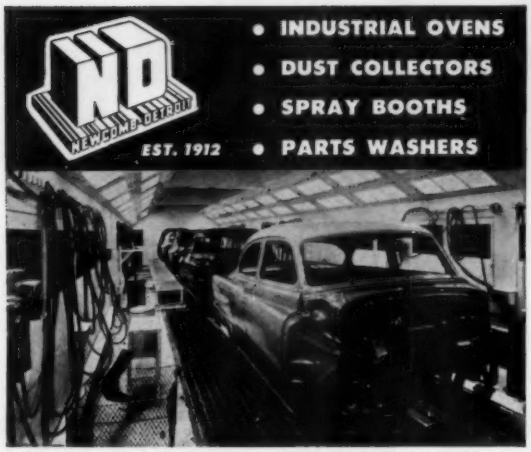
400 **Service Regulators**—Revised Bulletin 1026, 20-pp features company's line of service regulators. Rate-of-flow graphs illustrate mathematically the determination of maximum outlet pressure build-up and amount of gas relieved to atmosphere by extra safety device in case of failure of regulator. Rockwell Mfg. Co.

401 **Versatile Electronics**—How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give electronic control its flexibility and application to a wide variety of installations are described. Minneapolis-Honeywell Regulator Co.

402 **For Industrial Metering**—Practical selection and application data on meters for industrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

403 **Thermal Controls**—Descriptive and basic technical data on company's Thermoswitch controls are presented in 16-pp condensed Catalog 500. Products listed include the following types of controls: standard line, differential expansion; liquid filled snap-action, midget and miniature differential expansion; indicating controllers, bulb and capillary, and electronic. Fenwal, Inc.

404 **Scale Selection**—A variety of scales are presented in Catalog 651. Contains complete technical information on dormant platform,



SPRAY BOOTHS

Newcomb Spray Booths are adaptable to manual, automatic, and electrostatic spray operations—floor or overhead conveying. Designed for minimum maintenance. Individual tanks or central sludge systems. Automatic sludge recovery systems.

Dip coating and Flow coating systems complete with ventilated drip areas and complete fire protection.

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DINGS PRESENTS . . .

THE All New

"easy-clean"

MAGNETIC FLOORSWEEPER

Here's the *only* magnetic floorsweeper designed for *easy cleaning!* It's a brand new Dings model that automatically sweeps the floor clean of chips, turnings, nails and other dangerous metal . . . discharges accumulated iron *in a second.* You save time, possible personnel injuries, and increase your scrap sales profits with this all-new Perma-Plate Floorsweeper.

Here's why it's "easy-clean"

No more stooping or wrestling with canvas covers! Just step on the stainless steel stripper plate and swing the handle. Iron drops right off.

S156-1/9

Dings

Write for Bulletin 1210-A-4

DINGS MAGNETIC SEPARATOR CO.

4766 W. ELECTRIC AVE.
MILWAUKEE 46, WISCONSIN

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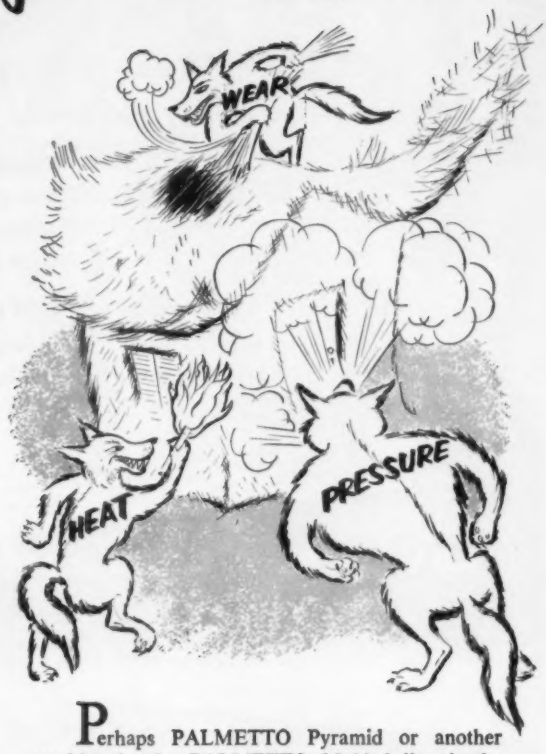
Is YOUR packing just a "house of straw"?



Perhaps PALMETTO Pyramid or another packing in the PALMETTO Molded line is the answer for improved performance of your operating equipment. Your nearest PALMETTO distributor can service you promptly and properly and you will save through the vast selection of Greene, Tweed molds that eliminate tooling expense. For the molded packing that lasts longer, reduces downtime—consult the product descriptions below.

PALMETTO PYRAMID ® is rugged, patterned on a square—will not twist or roll. This improved Vee-packing design is engineered for more efficient, longer lived sealing in pumps, valves, air and gas compressors, presses, cylinders and other hydraulic and pneumatic equipment. Automatic and self-sealing, Palmetto Pyramid gives longer, more efficient sealing of hydraulic oil, air, hot or cold water, steam, hot oil, gas, gasoline—many solvents and chemicals.

PALMETTO KUP is highly efficient for piston assemblies on inside packed piston pumps, pneumatic or hydraulic cylinders. Available in a variety of structures to seal the standard or new synthethic fluids. More resistant to heat than leather—will not dry out in air.

PALMETTO U-RING, with its new and improved design offers a wide flare that seals in cylinders up to .030 over nominal diameters. Available in a large number of popular sizes.

For the name and location of the PALMETTO distributor nearest you, see Greene, Tweed's two-color insert at the head of the packing section in Thomas' Register—or write.

packing more performance into every application

PALMETTO Packings

GREENE, TWEED & CO.

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ELECTRIC POWER UNITS
AIR SAFETY SWITCHES
INDICATING INSTRUMENTS
DRAFT REGULATORS
CONTROL PANELS
AUTOMATION IN COMBUSTION
CLEVELAND SEQUENCE DRAFT Control Systems
• For all methods of firing
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• Fully modulating
• All electric operation
FEATURING
• Lo-Draft Safety Switch
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Typical schematic of "Cleveland" Draft Control System taken from FREE booklet.
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Controls by "Cleveland"—Every Location in the Nation Over 100 Sales Engineers Ready to Serve You
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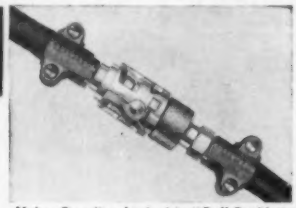
Quick-As-Wink®

safety type, locking, quickly detachable


Valve Coupling Locked in "On" Position

VALVE COUPLINGS

give operator complete control of the air line at any point

Operator can shut off air and change tools quickly. Newly improved design permits the coupling to be locked in either "On" or "Off and Exhaust" position. Air in tool is exhausted to atmosphere automatically, preventing accidents. Pressure tight leak-proof construction — but free swiveling to avoid kinking the hose. For any application involving line air to 250 psi.

Valve Coupling Unlocked and Disconnected

Valve Coupling Locked in "Off and Exhaust" Position

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Quick-As-Wink®

Air and Hydraulic Control Valves and Pressure Specialities

C. B. HUNT & SON, INC.

2084 EAST PERSHING STREET • SALEM, OHIO

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DATA FILE

(Begins on page 234)

portable and bench scales. Also describes and illustrates meat packing, motor truck and dairy type scales. Introduces a heavy-duty scale with air-controlled filling device which measures light or heavy oils, chemicals, paints, varnishes, syrups and other liquids at the touch of a button. Detecto Scales Inc.

405 **Combustion Controls**—Included in this catalog (about 16 pp) are product descriptions of company's combustion instruments and controls. Covers damper controls; drive units; draft, air pressure and flue temperature gages; steam controls; panel board cabinets; low-draft cut-off switches. Pages are fully illustrated to show design and operational details, and brief text includes application suggestions, special features. Cleveland Fuel Equipment Co.

406 **Temperature Controls**—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating, non-indicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices and references to detailed literature. The Partlow Corp.

407 **Control Relay**—Eight-pp Bulletin PL 7305-PM describes company's line of control relays, designed to occupy minimum panel space, and available in models with from two to 12 poles. Pictures 10 models, gives dimensions, enclosures, features, and data on maintenance and pole conversion from normally-open to normally-closed; and lists literature and template kits available. Clark Controller Co.

408 **Contour Projectors**—The use of projection or optical gaging with company's contour projectors is discussed in this illustrated bulletin. Points out chief advantages and describes typical applications. Specifications and dimensional diagrams for a number of models are included. Eastman Kodak Co.

409 **For Limited Panel Space**—Bulletin 532 describes Model 216 indicator used with company's automatic tank contents gage. Bulletin contains a full illustration of indicator which, although occupying a small space, has a scale length of 20 in. Also included is a description of operation of gaging system and mounting dimensions. The Liquidometer Co.

VIBRATION CONTROL

410 **Vibration Control**—Bulletin F2A shows how to write complete, correct vibration control specifications for all types of air conditioning and related equipment regardless of the operating conditions. Contains a definitive treatment of factors involved in selection of various isolation media, with particular attention to the influence of existing job conditions. A selector chart included. The Korfund Co., Inc.

411 **How to Cut Vibration** — The use of Vibra-Mount felt in reducing machine vibration and accompanying noise is covered in this 20-pp illustrated booklet. Tells where this shock-absorbing felt is used effectively, how to select the proper mount, and how to install it. Cost information is provided, other felt products are listed. American **Felt** Co.

TOOLS, WELDING, AND MACHINE SHOP EQUIPMENT

412 **Data for the Shop**—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

413 **Portable Electric Tools**—This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. Photos included. The Black & Decker Mfg. Co.

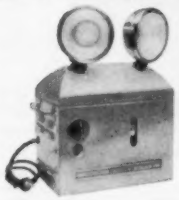
Some just *COVER THE LAW*

CARPENTER-LIGHTS
give real PROTECTION

Life and limb are at stake when you purchase emergency lighting. Be certain that the product you buy is designed and built to do the job . . . not just meet minimum requirements. Don't compromise on quality if you want to assure dependable protection against injury, panic, theft, financial loss, and (above all) moral burdens on your conscience.

Compare quality! Just one look at the inner components of several competitive makes will prove that CARPENTER-LIGHTS are built to last longer, give better service, assure you that when fuses blow or **when power lines fail — CARPENTER-LIGHTS won't!**

Shown here is one of the new models of Carpenter's famed "AUTOMAT-ALITES" which guards against hazards of light failures automatically. When current fails, two powerful, sealed-beam floodlights give instant protection to allow safe evacuation, permit manipulation of critical controls, or in the case of vital operations, enable work to be continued. Explosion-proof, remote control, and other models also available. Write for details.



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Manufacturing Company
280 Bradley St. Somerville 45, Mass.

NEW! "HYDRO-CAPS"
Send for details about these marvels that return the water to your batteries, cuts maintenance costs, prolongs battery life. Write for information today.

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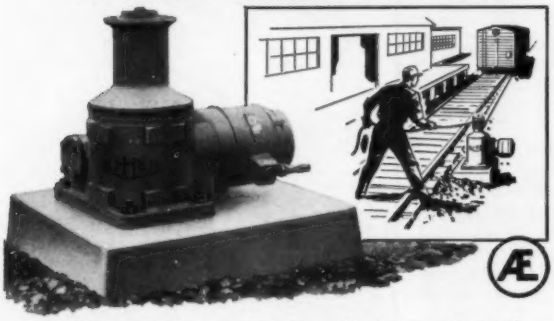
NOW! STOP WASTEFUL EXPENSE AT YOUR RAILROAD SIDING



IF YOU actually saw a Lo-Hed Car puller in operation you'd probably order one in a hurry. It is a first rate investment — pays for itself fast. It puts a stop to shifting charges. Cars get loaded and unloaded in record time. Demurrage charges are slashed. Industrial accidents are minimized . . . And a Lo-Hed Car Puller saves money *inside* a plant, too — pulls loads in a straight line, up grades and around corners.

Lo-Hed Car Puller is rugged, electrically-driven, built for trouble-free service. Write for folder telling you how to use a Car Puller in your plant.

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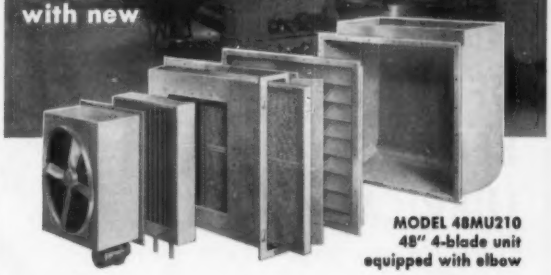
"WINTERIZE"

to
eliminate drafts
reduce heat losses
improve fan efficiency
with new

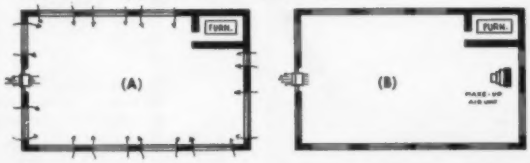


MODEL 48MU210
48" 4-blade unit
equipped with elbow

Aerovent INDUSTRIAL MAKE-UP AIR UNITS

Performance of fans and ventilating equipment installed to exhaust from production and processing areas depends *entirely* upon the availability of ENOUGH AIR! Without sufficient quantities to replace air exhausted, the air-handling system is soon "starved," creating a negative pressure or "vacuum" condition which is responsible for infiltration of outside air around doors and windows. The effect of the resulting draft places an additional work load on the plant heating system, with an ultimate decline in temperatures throughout the working area.

Here's a typical "MU" installation:



Warm air, exhausted from a machine shop area, replaced by cold air pulled through cracks and door openings (A). Filtered and tempered air, supplied by Make-Up Air Unit installed in same area (B) helps to maintain constant temperatures; levels-off "peaks" and "valleys" in boiler or furnace loading.

New Aerovent Industrial "Make-Up" Air Units, designed to supply ample quantities of clean, pre-heated air, aid in maintaining peak fan performance, reducing drafts and in stabilizing uniform heating loads. Available in seven unit arrangements in sizes 24" to 54" for capacities to 33,000 CFM. Write for free Bulletin 850.

All Aerovent Fans are rated in accordance with the Standard Test Code and U.S.D.C. Comm. Std. CS178-51

Aerovent FANS *Aerovent*
FAN COMPANY, INC.
Ash and Bond Sts. • Piqua, Ohio

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Norgren

THE MOST COMPLETE LINE OF AEROSOL BEARING LUBRICATORS

1/3 Pt. Oil Capacity

Model	Bearing-inch Rating
30-40-2S	32
30-40-3S	32
½ Pt. Oil Capacity	
30-41-2S	32
30-41-3S	32

1 Qt. Oil Capacity

Model	Bearing-inch Rating
S3406-2S	32
S3406-6S	200
S3406-8S	300

2 Qt. Oil Capacity

Model	Bearing-inch Rating
S3408-2S	32
S3408-6S	200
S3408-8S	300

MICRO-FOG by Norgren

1¾ Gal. Oil Capacity

Model	Bearing-inch Rating
X3400-2S	32
X3400-6S	200
X3400-8S	300

4½ Gal. Oil Capacity

Model	Bearing-inch Rating
Y3400-2S	32
Y3400-6S	200
Y3400-8S	300

Better Lubrication—Automatically, continuously applies finely divided air-borne oil fog.

One Lubricator Per Machine—A lubricator for every size job, 1000 bearing inches and less.

Oil Always Fresh, Clean—No recirculation of contaminated lubricant.

Big Savings in Equipment—Banishes pumps, reservoirs and filters. Fewer oil seals required; less seal maintenance. Manifolding results in equipment savings.

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Visual Oil Feed—Indicates proper operation of lubricator.

2 Gal. Oil Capacity

Model	Bearing-inch Rating
33AH-16	300
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DATA FILE

(Begins on page 234)

414 **Pipe Tool Ordering Guide** — Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

415 **On Spot Welding**—"Spot Welding from One Side—With a Portable Gun," 12 pp, describes an inert-gas-shielded tungsten-arc spot welding process. Over 30 tables, weld cross-section and application photos, drawings and graphs are included. Sections of text cover when to consider spot welding from one side, how the equipment operates, standards and test procedures, factors affecting weld. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

ELECTRICAL

417 **Motors for Many Jobs**—Bulletin 1878 is a colorful, 8-pp revamped publication including a more complete line of company's motors. Descriptions and illustrations cover open-type Uniclosed designs, totally-enclosed and explosion-proof types, Varidrives, Synchrogears, and right-angle models; also vertical motors and hollowshaft types. U. S. Electrical Motors Inc.

418 **Motor Buying Tips** — Bulletins GEC-1026A and GEC 1027A, each 11 pp, gives buying information on a selected group of this manufacturer's motors. Included are application data, ratings and prices for fractional horsepower motors, integral-horsepower polyphase and single phase induction motors, motors and control for part winding starting, gearmotors and resilient-base integral-horsepower induction motors. General Electric Co.

419 **FHP Manual Starters**—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

421 **FHP Manual Starters**—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

422 **Enclosed Switches**—Catalog 83, 28-pp, describes in detail enclosed switches for industrial applications. Included are general switches designed for use on either a-c or d-c purpose switches, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and electrical ratings. Photos, dimensional drawings, circuit diagrams, electrical data are included. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

423 **Low Voltage Switchgear** — Twelve-pp Bulletin 6004B presents low voltage switchgear of the metal-enclosed, drawout type for indoor and outdoor installation using Types K and LG air circuit breakers. Design and construction details are explained and illustrated and emphasis is placed on safety advantages afforded by test position with door closed. General specifications and standard frame arrangements given. I-T-E Circuit Breaker Co.

424 **Commutator Slip Ring Maintenance**—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

426 **Panel Components**—Bulletin EE-120 is a 54-pp panel builders handbook of electrical components, containing specifications, diagrams, dimensions, photos and price lists of company's motor control. Profusely illustrated with photos, dimensional and wiring diagrams, bulletin covers manual starters, relays and contactors, magnetic starters in non-reversing, reversing, and multi-speed types, and a group of accessories which include thermal overload relays, oil tight pushbutton units, limit switches, timing devices, solenoids, electrical interlocks, and solenoid-operated brakes. Cutler-Hammer, Inc.

427 **High-Capacity Fuses**—Form HCS, 6 pp, describes fuses of unlimited interrupting capac-

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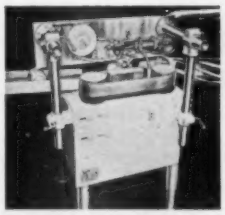
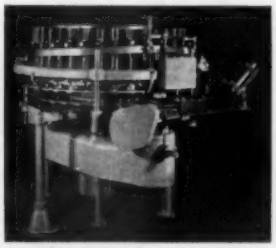


*The outsert applicator is a patented fast-action machine that attaches your message to the *outside* of your package—automatically! It's fully described in Bulletin 933.



RP-35 rotary piston filler—just one of several available piston fillers. Any one of them can package viscous or semi-solid products accurately and quickly. They're all described in Bulletin 911. For information on the many models of Pfaudler *gravity* fillers, request Bulletin 843.

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DATA FILE

(Begins on page 234)

ity on voltages to 600, designed to afford protection for loads of 600 to 5000 amp. Includes test data, charts on opening time, current limiting effect. Bussmann Mfg. Co.

428 Wire and Cable—Bulletin 1096, 16-pp contains detailed information on electrical wire and cable, as well as insulation and protective covering. Two selection charts—one by application and environment and one by cable type—are a practical guide to selection of best cable for a particular application. Minimum standard industry specifications are listed. Trade names are also given. The Okonite Co.

429 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

430 Trolley Busway Systems—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44-pp) 100 amp systems; Bulletin 45 (40-pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and descriptions and illustrations of equipment. Feedrail Corp.

431 Asbestos Insulation—"Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Also measures plus values of the construction over and above industry standards. Standards for test characteristics, such as minimum permissible breakdown after initial dielectric test are covered. Rockbestos Products Corp.

432 Testing Instruments—Bulletin 19-56, 16 pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor rotation tester, cable fault locating equipment, transformer turn ratio test sets, corona test equipment, frequency meters, tachometers, others. Includes photos and descriptions of each type, including chief features, operating ranges, and suggested applications for them. James G. Biddle Co.

433 Handbook on Storage Batteries—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

434 Motive Power Batteries—This 48-pp general service manual on lead acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods, including safety practices, acid handling precautions, and charging methods. C & D Batteries, Inc.

Reader Service Cards for ordering catalogs are on pages 229-230. Be sure to include your name, job title, and company.

435 Flexible Cords—This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

436 Cable Troughs—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers and many special fastening devices to save time and labor. Contains full instructions for installation, load charts, accessory items, some typical installations and full list of distributors. The Globe Co.

SPACE, PROCESS HEATING

437 Plumbing, Heating Supplies—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

438 Hot Water Heating Systems—Catalog GK-954, 24 pp, features a complete line of equipment for forced hot water heating systems and chilled water cooling systems. Nine pages are devoted to information on a complete line of circulating pumps for dozens of applications. All-bronze pumps for circulating service water and silent operating centrifugal pumps for boosting water pressure are a few of the new applications. Valves, fittings, air vents, air tanks are also described. Bell & Gossett Co.

439 Unit Heaters—Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

440 Electric Heating Units—Catalog 50, 50 pp, contains complete engineering data on electrical heating units and equipment, including strip elements, finstrip elements, tubular elements, cartridge elements, ring elements, immersion heaters, circulation heaters, radiant heaters, forced air duct heaters, unit heaters, hot plates and others. Includes photos, dimensional drawings, price and standard rating tables and other specifications. Edwin L. Wiegand Co.

441 On Unit Heaters—Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories, controls. Also provided are suggested layouts, piping diagrams, other data. American Air Filter Co., Inc.

442 Revolving Unit Heaters—Bulletin HR-6A, 16 pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included, along with installation planning tips and specifications. L. J. Wing Mfg. Co.

443 Industrial Ovens—Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

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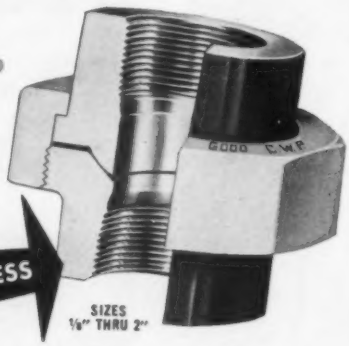

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In the National Hydro-Filter, contaminated air never comes in contact with a dry surface. There are no baffles to clean, no "blind" areas to clog and reduce efficiency. Water flows countercurrently to air to produce *full time* self cleaning action. Automatic sludge removal completes the picture.

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Exclusive Spencer features include a removable dirt can, an invertible bag which is shaken out while inside the machine, a swivel elbow between the vacuum hose and the handle and scores of vacuum tools designed especially for industry.

This machine is also ideal for cleaning factory offices, small warehouses, furnaces and all types of commercial buildings.

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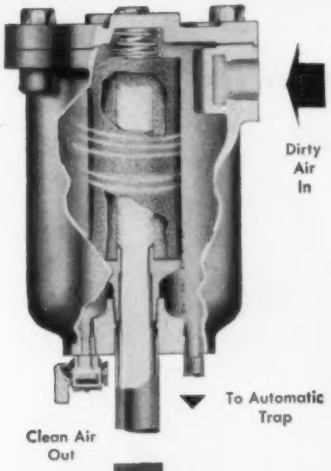

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DATA FILE

(Begins on page 234)

444 **Industrial Ovens** — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

WATER TREATING

445 **For Industrial Water Softening**—Greensand, zeolite and resinous exchange water softeners are described in 8-pp Form S105. Discusses features and applications of each of these basic types and illustrates some installations. Includes capacity data and general specifications. Also describes and pictures controls for water softeners, pressure filters and deionizers. Illinois Water Treatment Co.

446 **Industrial Filters**—How industrial filters can lower production costs is the theme of 10-pp Bulletin 651. Several simple case histories—from filtering city water to the filtering of recirculation water from cooling towers and spray ponds—are cited. Company's new line of IWF filters is featured, including sectional views, typical installation drawings, dimension charts. R. P. Adams Co., Inc.

VALVES, TRAPS PIPING AND ACCESSORIES

447 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. The Walworth Co.

448 **Diaphragm Valves** — Catalog V-55, 34 pp, covers operation, installation and selection of diaphragm valves for handling of acids, alkalis, gases, volatile and viscous substances, water and other fluids, compressed air vacuum, slurries, semi-solids, beverages and food products. Diaphragm materials are described, selection tables included. Hills-McCanna Co.

449 **Lubricated Plug Valves**—Catalog PV-4, 36 pp, shows in detail a line of iron and steel lubricated plug valves. Many illustrations of single, screwed and bolted gland type valves are shown, including photos, sectional and detailed drawings. Also included is physical data on dimensions, ratings. The Wm. Powell Co.

450 **For Quick Valve Selection** — Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

451 **Valve Performance Facts**—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Industries include paper mills, refineries, central stations, other plants. Crane Co.

452 **Bronze Valves**—Bulletin 110 points out the advantages of company's "500 Brinnell" bronze globe and angle valves with stainless steel seat and disc. Design features are illustrated and dimensional data is included. Kennedy Valve Mfg. Co.

453 **Corrosion Resistant Valves**—Monel and nickel corrosion-resistant valves are described in Bulletin 9. Discusses corrosion-resistant properties of Monel and nickel, listing specific application for which each is suited. Gives casting composition of both alloys and describes their mechanical properties. Cross-sectional illustrations of gate, globe and check-type valves are included. Alloy Steel Products Co.

454 **High Pressure Valves**—Bulletin B-451, 12 pp, contains complete engineering data on company's valves for high pressure and high temperatures. Typical installations are pictured, dimensions and weights are tabulated, and temperature-pressure ratings are shown. A selection table is included, as well as information on materials, design. Yarnall-Waring Co.

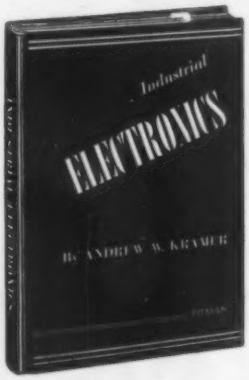
456 **Valve Data**—This loose-leaf notebook contains a collection of company's bulletins on its line of valves for control of air, gas, liquids and solids. It features complete operating, design, dimensional and specification data on butterfly, slide, automatic and proportioning valves, and is profusely illustrated with photos, drawings and diagrams highlighting valve design. W. S. Rockwell Co.

457 **Water Hammer Control**—Cause, effect and control of water hammer in piping systems is the subject of 8-pp Bulletin WH 851. Photos, drawings and curves supplement text, and test data is presented to show efficiency of company's silent check valves in water hammer control. Some typical installations are illustrated. The Williams Gauge Co., Inc.

458 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressure up to 1500 lb. W. H. Nicholson & Co.

459 **Steam Trap Book**—Catalog J is a 44-pp manual and ordering guide in which 17 pp are devoted to data on fundamentals of good trapping and trap selection. Installation and maintenance instructions are also provided. Book lists steam traps for maximum pressures of 250, 600, 900, 1500 and 2500 psig. Included, also, is a section on trouble shooting. Armstrong Machine Works.

460 **Unions, Check Valves**—Illustrated Catalog 55, 24 pp, describes and provides ordering information on a line of forged steel unions and check valves. Socket-weld, high-speed, orifice, O-ring and other unions are included.



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what they are
how they work
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This book explains in clear, simple, non-technical style the basic principles of electronics, and how these principles can be applied in industry. Electronics has been solving the unsolved problems. Whether it is navy beans, opening doors at a shadow, or measuring the thickness of red-hot steel plates, the electron is the newest and most efficient force captured by science. This book should be invaluable for the practical maintenance or operating executive or engineer. 311 pages, 229 illustrations, $6.00.

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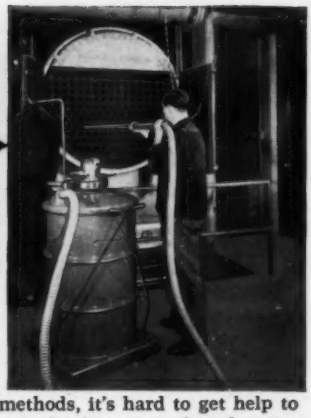

A dirty boiler is an inefficient heating unit, it's costly to operate and by old methods, it's hard to get help to keep it clean. Soot coated tubes can reduce heating by 50%, which means extra hours of running with a resultant fuel waste.

Now you can clean your boiler tubes as often as twice a week during the heating season with American's new Model 500-55 Boiler Cleaner, and you can do it faster and cleaner than ever before possible. You'll save on fuel, on labor, keep your boiler and building cleaner and warmer all winter long with the Model 500-55 Boiler Cleaner. Can be used also to clean any and all other hard-to-get-at places, easily and quickly. Write for full details and prices. 102

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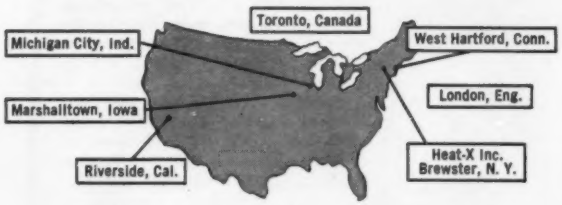

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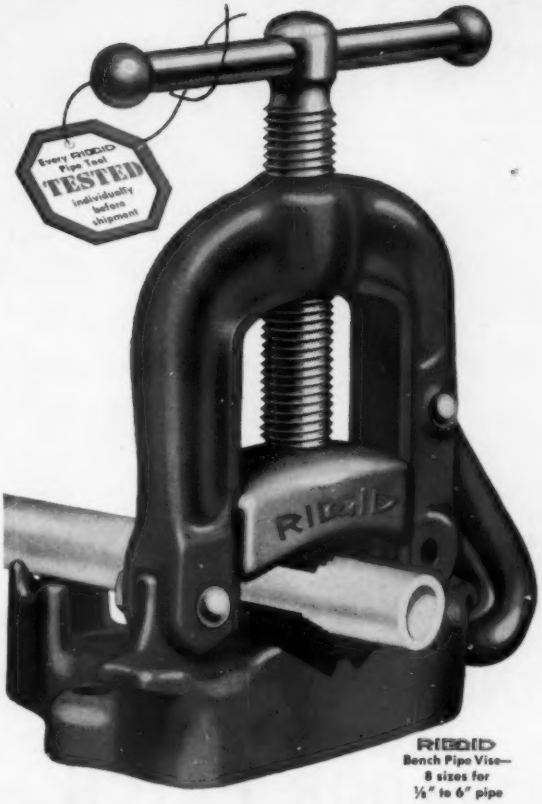

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RIDGID
Work-Saver Pipe Tools

The Ridge Tool Company, Elyria, Ohio, U.S.A.

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DATA FILE

(Begins on page 234)

Catalog provides service recommendations, dimensions and list prices. Also included is table covering discharge of water to atmosphere. Clayton Mark & Co.

461 **Coupling Data**—Bulletin 240 describes a quick-connect, quick-disconnect H coupling, its uses and construction, with particular reference to U-packer which gives positive seal without compression set because of rubber distortion. A fully detailed cutaway of coupling is included and dimensions and ordering information given. Snap-Tite, Inc.

462 **PVC Pipe Fittings, Flanges**—This is a comprehensive 12-pp catalog on corrosion resistant pipe fittings and flanges in normal- and high-impact grades, rigid, unplasticized polyvinyl chloride. Shows characteristics, advantages and limitations. Lists operating pressures, temperatures, applications, price comparisons, fabrication advice, installation and supporting recommendations, dimensions and weights. Grinnell Co., Inc.

463 **Aluminum Pipe and Fittings** — Aluminum pipe—for conveying everything from air to acid — is described in this 18-pp Form AD197. Booklet presents characteristics and advantages for each major field of application. Specifications are provided, along with a description of appropriate fittings and methods of installation. Describes process industry applications and advantages. Similar treatment is accorded other fields, including pipelines, portable piping, and structural piping. Aluminum Co. of America.

464 **Welding Fittings**—When and where to use company's Weldolet welding fittings is told in 38-pp Bulletin W-4. Includes tables listing sizes, dimensions, weight, and price, as well as dimensional drawings. Installation procedure is fully described and specifications, graphs providing reinforcing information, and photos of typical applications are also included. Bonney Forge & Tool Works.

465 **Jointed Clay Pipe**—Advantages of jointed vitrified clay pipe designed to limit and control leakage of ground water in sanitary systems are described in this illustrated bulletin. Performance characteristics are discussed and typical installations are pictured. American Vitrified Products Co.

466 **Plastic Pipe, Fittings**—Two types of unplasticized PVC pipe and fittings are described in 6-pp Bulletin T.D. 119, a normal impact grade and a high impact grade. Advantages of both types are given. Applications are listed by industry and process, and the full range of corrosion resistance is defined. Tables show physical properties, dimensions and weights, working pressures, burst pressures, other data. Installation instructions included. The Carpenter Steel Co.

INSULATION

467 **Piping Insulation** — Seven-pp Bulletin SO 1054 features a snap-on, one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Specifications are given for industrial, commercial, and institutional piping where maximum efficiency is of primary importance and for hot water and low pressure steam. Gustin-Bacon Mfg. Co.

468 **Industrial Insulation**—This 8-pp bulletin describes Alltemp, an all-temperature pipe and block insulation from 100 to 1600 F. physical characteristics, recommended thickness data, method of application are included, with 10 advantages of this insulation. Other industrial insulations also described from 2500 F to sub-zero. The Philip Carey Mfg. Co.

LIGHTING, SIGNALING

469 **Fluorescent Lighting**—This 24-pp fluorescent lighting guide book is a reference digest on fluorescent products. Gives advantages of this type of lighting; summarizes various lamps and parts, including starter sockets, lampholders. Includes reference chart for lamp performance when interchanged with typical ballasts. Sylvania Electric Products Inc.

470 **Guides to Luminaires** — Pocket-size, 28-pp Bulletin B-5799-BB covers fluorescent luminaires for industrial and other use. Summarizes salient features of each type of luminaire as it discusses electrical characteristics, maintenance and mounting data, details of construction, dimensions, and recommendations for application. Also contains a pictorial guide to floodlights and incandescent luminaires for industrial and other use. A 4-pp tabulation of buying data concentrates information needed for procurements. Westinghouse Electric Corp.

471 **Industrial Lighting Units** — The 36-pp 1956 Edition of the RLM Standard Specifications for industrial lighting units contains important revisions in specifications on both incandescent and fluorescent industrial lighting units, as well as new lighting data of special value to specifiers. Most important of the changes and additions are new coefficient of utilization tables for eight incandescent and fluorescent lighting units. Calculations are based on latest Zonal Method of computing coefficients of utilization and illumination on room surfaces. Also included are revised light distribution curves on RLM fluorescent lighting units. RLM Standards Institute, Inc.

472 **Industrial Lighting**—Designed to be inserted in company's lighting catalog, these two data sheets describe application, construction, installation and wiring details of two types of lighting units. Section 30, Sheet 20 features all-porcelain industrial units and Section 30, Sheet 18 covers vapor-tight units. Engineering data included. Day-Brite Lighting, Inc.

473 **For Emergency Lighting**—Catalog 10, 8 pp, offers technical data on equipment designed to promote instant automatic emergency lighting protection whenever the regular source of power fails. Includes automatically charged lighting units, types for hazardous areas, emergency power systems, exit lights, emer-

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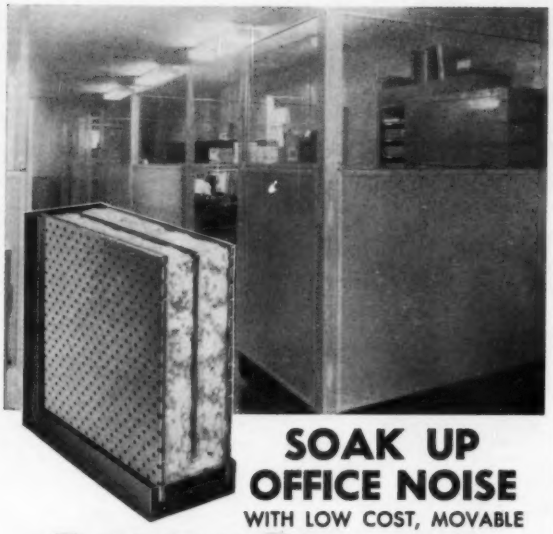

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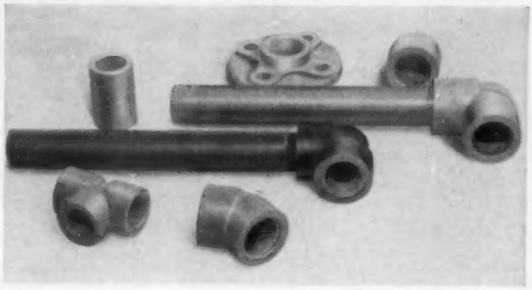

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DATA FILE

(Begins on page 234)

gency light and hand lamps, lanterns, low voltage extensions. Electric Cord Co.

474 Architectural Floodlighting — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Also contains tips on floodlighting of vertical surfaces and discusses four "musts" of an efficient economical floodlighting installation. A table of recommended foot-candle levels for exteriors provided. General Electric Co.

475 Signal Equipment — Tips on how to select suitable signals for any specific operation are offered in one of a series of bulletins—Nos. 100-125—bound in this 40-pp catalog. Other bulletins describe horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

476 How to Use Sound Signals—This 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a code signal call system. Benjamin Electric Mfg. Co.

OTHER EQUIPMENT

477 Synthetic Fluids, Lubricants — Form F-6500D, 52-pp, on synthetics, covers properties, applications, and characteristics of these poly-alkyline-glycol derivatives. Describes uses as mechanical lubricants, hydraulic fluids, rubber and textile lubricants, heat-transfer fluids, anti-foam agents, solvents, and formulation components. Engineering data is presented in the form of tables and charts, and application photos included. Carbide and Carbon Chemicals Co., Div., Union Carbide and Carbon Corp.

478 Neoprene Design Book—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Elastomers Div., E. I. du Pont de Nemours & Co.

479 Steel Reservoirs, Standpipes—This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Chicago Bridge & Iron Co.

480 Magnetic Selection Guide — Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets, serve as handy guide to selection. Dings Magnetic Separator Co.

481 Pressure Tubing—Advantages and uses of Nylaflow pressure tubing are presented in this 8-pp bulletin. Describes characteristic features and answers specific questions in a step-by-step analysis of how tubing meets the needs of a successful centralized lubricating system. The Polymer Corp. of Pennsylvania.

482 Hydraulic Cylinders — Catalog 200-6, 26 pp, describes company's hydraulic cylinders for die casting, pushing, lifting, holding, pulling, tilting, clamping, pressing, turning, squeezing and other power movements in any direction. Construction features and specifications are detailed, sectional drawing showing component parts is included, as well as dimensional and mounting data. Logansport Machine Co., Inc.

483 Preheating Combustion Air—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output. Air Preheater Corp.

484 Glassed Steel Reactors — Bulletin 927, 8 pp, describes glassed steel reactors for processing a wide variety of products under diverse conditions, stressing their versatility as to corrosion resistance, agitation, and temperature-pressure range. Standard specifications are tabulated and dimensional diagrams are included. The Pfaudler Co.

485 Television Equipment — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

486 Detergent Oils—How to clean sludge out of hydraulic and lubrication systems without shutting down machines is told in Technical Bulletin 44. Also tells how continued use of these highly detergent oils keeps equipment as clean as new. Sun Oil Co.

487 Teflon Products—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing, and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

488 Water-Cooled Stoker—Design and operating advantages of the Vibra-grate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker and explains operating features. Other drawings show typical installations. American Engineering Co.

489 Rigid Plastic Material—The advantages, uses and available forms of Bolatron 6200 are presented in this catalog, about 14 pp. Gives dimensional data, tolerances, weights for sheet, bar stock, pipe, fittings and valves made of this unplasticized polyvinyl chloride. Includes thermal, electrical and mechanical properties, also detailed information on chemical resistance. H. N. Hartwell & Son, Inc.

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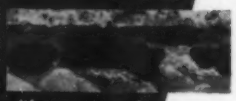

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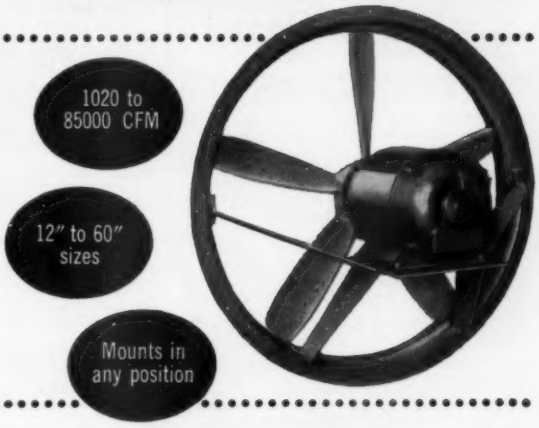

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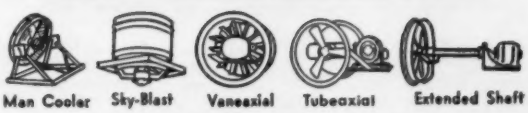

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Agency—Ketchum, MacLeod & Grove, Inc.

GUSTIN-BACON MFG. CO. 216-217
Agency—Valentine-Radford, Adv.

HAMER VALVES, INC. 178
Agency—The McCarty Company

HARNISCHFEGER CORPORATION 33-34
Agency—Hoffman & York, Inc.

HARTWELL & SON, INC., H. N. 189
Agency—The Sackel Company, Inc.

HARTZELL PROPELLER FAN CO. 262
Agency—Kight Advertising, Inc.

HORN COMPANY, A. C. 159
Agency—G. M. Basford Company

HUNT & SON, INC., C. B. 248
Agency—Henry T. Bourne Adv. Agency

IDEAL INDUSTRIES, INC. 232
Agency—Stoetzel, Inc.

ILLINOIS WATER TREATMENT CO. 261
Agency—Cummings, Brand & McPherson, Inc.

INGERSOLL-RAND COMPANY 228

INTERNATIONAL BOILER WORKS CO. 180
Agency—Renner Advertisers

I-T-E CIRCUIT BREAKER CO. SMALL AIR CIRCUIT BREAKER DIV. 74-75
Agency—Gray & Rogers

JOHNS-MANVILLE 68
Agency—J. Walter Thompson Co.

JOHNSON SERVICE COMPANY 183
Agency—St. Georges & Keyes, Inc.

JOY MANUFACTURING COMPANY 23, 238
Agency—W. S. Walker Adv., Inc.

KENNEDY VALVE MFG. CO. 202
Agency—Mellor Adv. Agency, Inc.

KEWANEE BOILER DIVISION 72
Agency—Charles O. Puffer Co.

KIRK & BLUM MFG. CO. 168
Agency—S. C. Baer Company

KORFUND COMPANY, INC., THE 192
Agency—Sanger-Funnell, Inc.

LeTOURNEAU, INC., R. G. 258
Agency—Evans & Associates

LINK-BELT COMPANY 57, 165
Agency—Klau-Van Pietersom-Dunlap, Inc.

LIQUIDOMETER CORP., THE 174
Agency—Gaynor Colman Prentis & Varley, Inc.

LOGANSPORT MACHINE CO., INC. 220
Agency—Willis S. Martin Co.

LYON METAL PRODUCTS, INC. 61
Agency—Reincke, Meyer & Finn, Inc.

MACWHYTE COMPANY 79
Agency—Needham, Louis & Brorby, Inc.

MAGUIRE COMPANY, WALTER 258
Agency—O. S. Tyson & Co., Inc.

MAHON COMPANY, THE R. C. 83
Agency—Anderson, Inc.

MANNING, MAXWELL & MOORE, INC. 42, 222
Agency—Fuller & Smith & Ross, Inc.

MARK & COMPANY, CLAYTON 252
Agency—Martin-Engel & Associates

MASONITE CORPORATION 191
Agency—The Buchen Company

MERCURY MFG. COMPANY 50
Agency—O'Grady-Andersen-Gray, Inc.

MICRO-SWITCH, DIV. OF MINNEAPOLIS-HONEYWELL REGULATOR CO. 26
Agency—Reincke, Meyer & Finn, Inc.

MINNEAPOLIS-HONEYWELL REGULATOR CO. 227
Agency—Aitkin-Kynett Co.

MISSISSIPPI GLASS COMPANY 177
Agency—Ralph Smith Adv. Agency

MODINE MFG. COMPANY 150
Agency—Klau-Van Pietersom-Dunlap, Inc.

MORTON SALT COMPANY 163
Agency—Needham, Louis & Brorby, Inc.

NATIONAL DUST COLLECTOR CORP. 253
Agency—Russell T. Gray, Inc.

NATIONAL EXPOSITION OF POWER & MECHANICAL ENGR. 198
Agency—O. S. Tyson & Co., Inc.

NATIONAL LEAD COMPANY 153
Agency—Rittenhouse & Company

NEPTUNE METER COMPANY 162
Agency—W. L. Towne, Advertising

NEWCOMB-DETROIT COMPANY 247
Agency—Gray & Kilgore, Inc.

NEW YORK AIR BRAKE CO. 235
Agency—Humbert & Jones, Adv.

NICHOLSON & COMPANY, W. H. 148
Agency—The Aitkin-Kynett Co.

NORGEN COMPANY, C. A. 250
Agency—Galen E. Broyles Co., Inc.

OTIS ELEVATOR COMPANY 14-15
Agency—G. M. Basford Company

PANGBORN CORPORATION 208
Agency—VanSant, Dugdale & Co., Inc.

PANTEX MFG. CORPORATION 172
Agency—Horton-Noyes Company

PARTLOW CORPORATION 188
Agency—Moser & Cotins, Inc.

PENCO METAL PRODUCTS DIV. 204
Agency—Doremus-Eshleman Co.

PENNSYLVANIA PUMP & COMPRESSOR CO. 158
Agency—H. Arthur Engelman

PFAUDLER COMPANY, THE 251
Agency—Charles L. Rumrill & Co., Inc.

PITTSBURGH CORNING CORPORATION 18-19
Agency—Ketchum, MacLeod & Grove, Inc.

PITTSBURGH PLATE GLASS CO. 146
Agency—Ketchum, MacLeod & Grove, Inc.

POLYMER CORP. OF PENNA. 44
Agency—Beaumont, Heller & Sperling, Inc.

PURE OIL COMPANY 157
Agency—Leo Burnett Company, Inc.

RADIATOR SPECIALTY CO. 244
Agency—Bennett-Evans Company

RADIO CORPORATION OF AMERICA 236
Agency—Al Paul Lefton Co.

RICHARDS-WILCOX MFG. CO. 166
Agency—Connor Associates, Inc.

RIDGE TOOL COMPANY 255
Agency—Carr Liggett Adv., Inc.

ROBBINS & MYERS, INC. 86, 259
Agency—Weber, Geiger & Kalat, Inc.

ROBERTSON COMPANY, H. H. 236, 237
Agency—Bond & Starr, Inc.

ROCKBESTOS PRODUCTS CORP. 209
Agency—Sutherland-Abbott Adv.

ROCKWELL COMPANY, W. S. 246
Agency—Spooner & Kriegel

ROCKWELL MANUFACTURING COMPANY 147
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

ROHM & HAAS CO. 59
Agency—Arndt-Preston-Chapin-Lamb & Keen, Inc.

ROME CABLE CORPORATION 196
Agency—Charles L. Rumrill & Co., Inc.

ROTARY LIFT COMPANY 184
Agency—Greenhaw & Rush, Inc.

SARCO COMPANY, INC. 43, 193
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

SCHNEIBLE CO., CLAUDE B. 240
Agency—Harold W. Jackson

SEXAUER MFG. CO., J. A. 242
Agency—Lawrence Peskin, Incorporated

SHELL OIL COMPANY 175
Agency—J. Walter Thompson Co.

SHLAGRO STEEL PRODUCTS CORP. 238
Agency—Parsons, Friedmann & Central

SLY MFG. COMPANY, W. W. 206
Agency—Bayless-Kerr Co.

SNAP-TITE, INC. 37
Agency—Lando Adv. Agency

SPENCER TURBINE CO., THE 253
Agency—W. L. Towne

SQUARE D COMPANY 65
Agency—Reincke, Meyer & Finn, Inc.

STANDARD OIL CO. (INDIANA) 197
Agency—D'Arcy Advertising Company

STANDARD PRESSED STEEL CO. 81
Agency—Gray & Rogers

SUN OIL COMPANY 39, 51-52
Agency—Ruthrauff & Ryan, Inc.

TEXAS COMPANY, THE ..... Second Cover
Agency—Erwin, Wasey & Co., Inc.

THOMAS FLEXIBLE COUPLING CO. 4
Agency—Lando Advertising Agency

TWIN DISC CLUTCH CO. 58
Agency—Curtiss, Quinlan, Keene & Peck, Inc.

UNITED STATES ELECTRICAL MOTORS, INC. 243
Agency—The McCarty Company

UNITED STATES STONEWARE 161
Agency—Ralph Gross Adv., Inc.

"UP-RIGHT" SCAFFOLDS 82
Agency—Norton M. Jacobs Adv. Agency

VIKING PUMP COMPANY 30
Agency—J. M. Hickerson Co.

WALWORTH 137
Agency—G. M. Basford Company

WARREN STEAM PUMP CO., INC. 194
Agency—The Davis Press, Inc.

WEBB COMPANY, JERVIS B. 195
Agency—Gray & Kilgore, Inc.

WESTINGHOUSE ELECTRIC CORP. 6-7-8-9, 199, 201, 203, 233
Agency—Fuller & Smith & Ross, Inc.

WESTINGHOUSE ELECTRIC CORP. 181, 210-211
Agency—McCann-Erickson, Inc.

WHITING CORPORATION 131
Agency—Waldie & Briggs, Inc.

WHITNEY CHAIN COMPANY 64
Agency—Woodward & Bryon, Inc.

WICKWIRE SPENCER STEEL DIV. OF CF&I 40, 223
Agency—Doyle, Kitchen & McCormick, Inc.

WIEGAND CO., EDWIN L. 226
Agency—Ketchum, MacLeod & Grove, Inc.

WIRE & IRON PRODUCTS CO., INC. 245
Agency—Ross & Company

YARNALL-WARING COMPANY 239
Agency—The Michener Company

YEOMANS BROTHERS COMPANY 240
Agency—Fensholt Adv. Agency, Inc.

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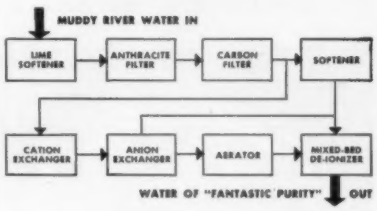

This block diagram shows a typical arrangement for a power company steam plant that must draw its boiler feed water from a nearby muddy river. The Lime Softener takes out suspended solids, turbidity, alkalinity, and organic matter; the Anthracite Filter removes any remaining turbidity; the Carbon Filter removes the chlorine; the Softener provides process water; the Cation and Anion Exchangers remove the dissolved solids such as carbonates, sulfates, and chlorides; the Aerator takes out most of the CO_2; and the Mixed-Bed De-Ionizer eliminates the remaining 4 or 5 ppm of solids, silica, and 5 ppm of CO_2 — to produce water of "fantastic purity."

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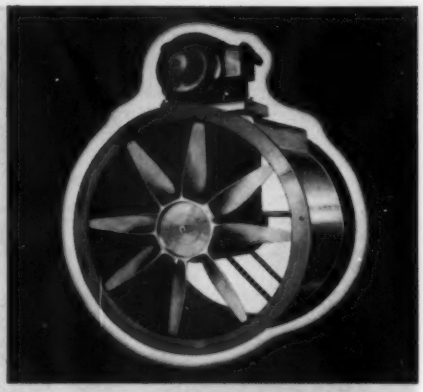

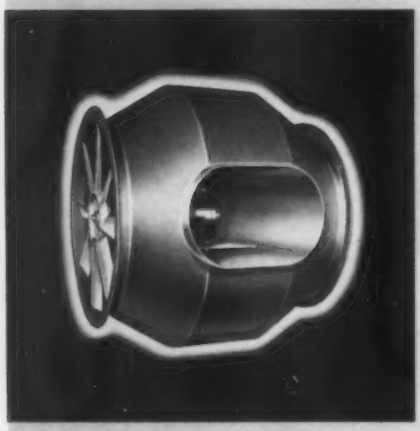

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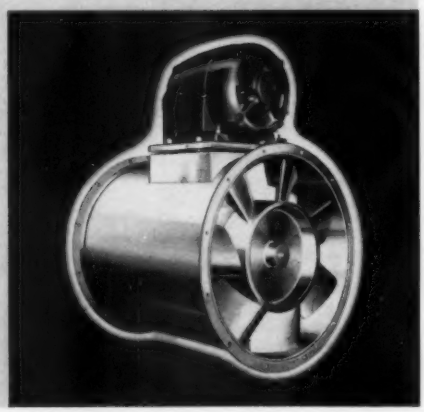

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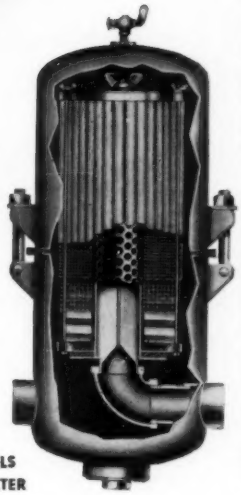

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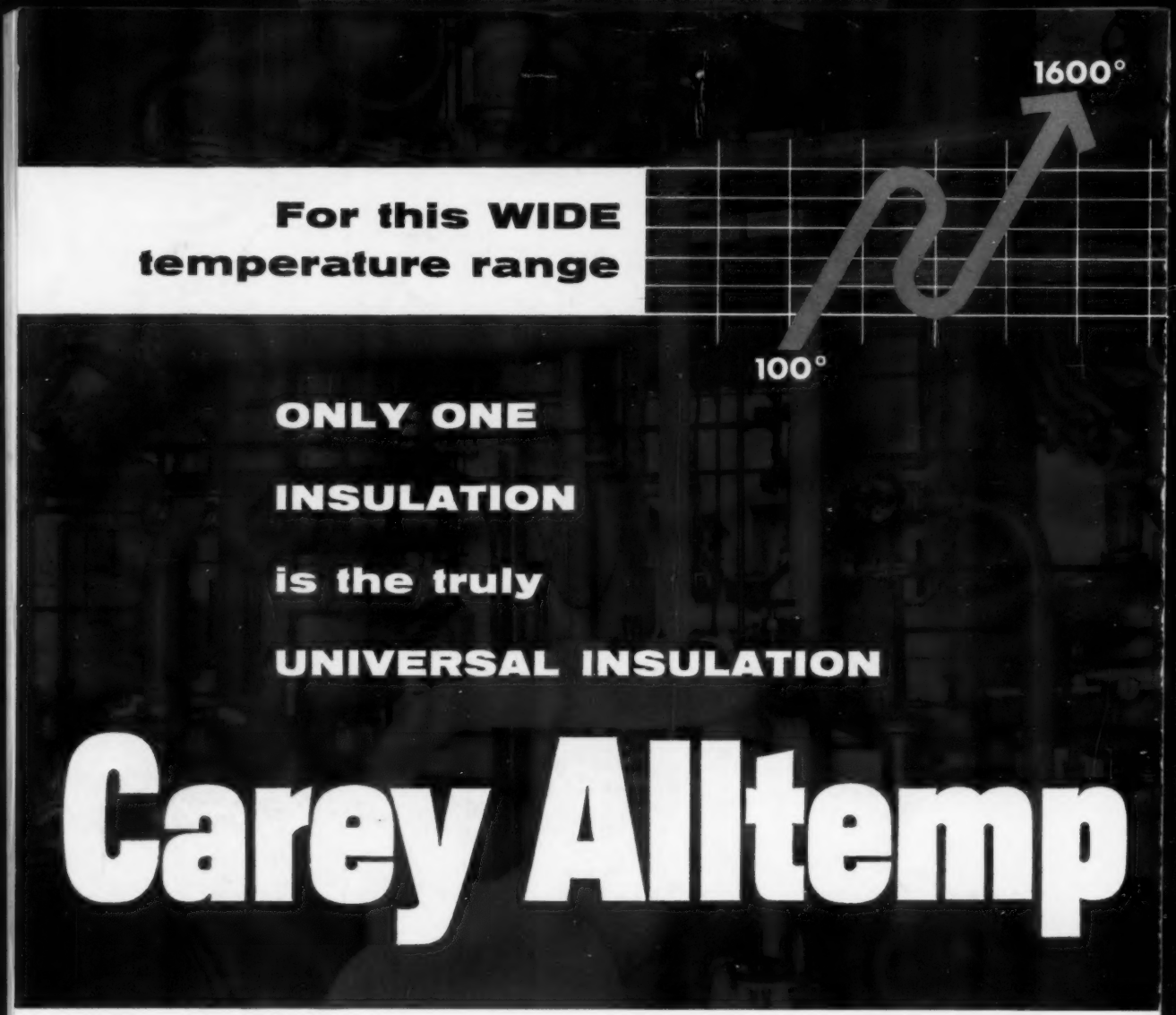

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IN THIS ISSUE

Planned Plant Painting Program 83
Stainless Steel Fabrication
I. Working the Hard-to-Work Metal 87
Maintaining Dry-Type Transformers 90
Mechanization Sparks Motor Making 92
How To Care for Glassed Steel Equipment 94
Welding Saves $1000 Per Day 97
Throw-On Floor Surfacing
Tough, Non-Skid, Dense Aggregate Used at Ford Plant. 98
Light Sources for Color Matching 100
How To Control Industrial Noise
II. Acoustical Treatment, Sound Absorbers 102
Applying Incentives to Maintenance Workers 107
All-Engineers' Luncheon 107
Industrial Parking Lots 108
Concrete Welding With Epoxy Compound 110
Adjustable Speed Control Package 112
Plant Electrical System Hazards 113
"Tepee" Rack For Bar Stock Storage 117
From 100 Painting Hours Down to 40 118
Q and A on Pump Problems 120
Fluid Power Maintenance—
IV. How To Care for Hydraulic Pumps 122
Instrumentation for Continuous Casting 128
Annual Index ..... Following page 228

REGULAR DEPARTMENTS

'Round About with the Editors 2
Bulletins and Catalogs 21
Backtalk About Our Past Issues 28
Plant Engineers' Digest 36
Operation and Production 52
Construction Briefs 73
New Plant Construction 130
News from the Plants 132
New Products and Processes 144
Review of New Books 186
Data File of Commercial Literature 200
Advertisers' Index 226

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